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QUALITY OF HEALTH CARE AND ITS ROLE IN COST RECOVERY IN AFRICA: Cost Recovery and Improved Drug Availability in Niger—Implications for Total Patient Treatment Costs

Phases 2 and 3: Field Work, Research Results, and Policy Recommendations

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ABSTRACT

Previous research posited that the regressive effects of cost recovery might be offset if the accompanying quality improvements generate not only health but economic benefits, primarily in terms of reducing additional travel to pharmacies that sold higher-priced drugs. Using quasi-experimental design methods, this study investigated, for a cost-recovery intervention in Niger, how the total costs of an episode of treatment for an acute illness for a typical patient changed when user fees were imposed but accompanied by an improved drug supply. Episode costs included both cash expenses and opportunity costs of time.

With few exceptions, the comparisons of both the unadjusted and adjusted patient episode costs showed that patient total episode costs in the intervention sites increased relative to the control site. The findings showed mixed results when comparing Say and Boboye in the changes they experienced relative to the trends in episode costs in Illéla. Using unadjusted episode cost averages, Boboye experienced a greater percentage decline than Say for the general population, for the poor, and for children under 15; an equivalent percentage decline for malaria-like cases; and a smaller percentage decline for females. In contrast, using adjusted episode costs, Boboye had relatively higher increases in episode costs than Say for all population groups.

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FOREWORD

This paper is one in a series of reports on findings and policy recommendations from Phase 3 of the Major Applied Research conducted by the Health Financing and Sustainability Project (HFS).

The Health Financing and Sustainability Project is a five-year initiative funded by the United States Agency for International Development (USAID). The project's mandate is to provide technical assistance, conduct applied research, implement training, and disseminate information on health care financing throughout the developing world. The project seeks to influence policy change by advancing knowledge; testing and improving delivery, financing, and administrative methods; strengthening institutional capacity; and enhancing technical capabilities. To date, HFS has been involved in health care financing activities in over 30 developing countries around the world. Applied research activities account for one-quarter of HFS project activities.

HFS has conducted its major applied research in three phases. Phase 1 included a review of the literature and of past experience and the development of a conceptual framework. The papers generated under Phase 1 are essentially conceptual and methodological and are therefore oriented to field researchers and teachers. Nevertheless, because these papers also underscore current gaps in knowledge, they are of use to international donors, health ministry decisionmakers, and others who are concerned with health care policy.

Phases 2 and 3 were designed to reduce the gap in current knowledge identified in Phase 1. Phase 2 comprised the field research and data collection, and Phase 3 has involved data analysis, report writing, and dissemination. Phase 3 papers have as their main audience developing country decisionmakers and policymakers, inside and outside the countries where the research was conducted. Methods, findings, and recommendations are written in nontechnical language, with technical information provided in appendices.

Phase 3 products also will be of interest to international donors because they validate or reject important hypotheses and evaluate existing policies. These papers also test new or improved research methods, identify directions for further research, and contribute empirical information to the general body of knowledge. Therefore they should be useful to researchers and academicians.

THE ROLE OF APPLIED RESEARCH IN HEALTH POLICY REFORM

Health financing reform is a prominent political issue and a priority for the health sector around the world. In industrialized nations, containing health care costs has been one main impetus behind efforts to reform health financing policies. In developing countries, a key motivating factor for reform efforts has been the growing demand on increasingly strained public resources represented by the traditional commitment of governments to provide free health services to all.

At the center of the policy debate are discussions about ways to improve equity and efficiency. Ideally, health care financing practices and policies should promote both equity—financial and physical access to care—and efficiency—maximization of health gains through reductions in the costs of production and increases in appropriate consumption. These discussions also include debate about the impact of health

financing reforms on quality of care, access by the poor, and the respective roles of the public and private sectors.

Formulating effective policies to address these issues requires sound empirical information on the demand and supply sides of the market for health services. In many developing countries, sound empirical data are seldom available and the public debate about health financing often is dominated by conventional wisdom that may not be well grounded in reality. Some examples of conventional wisdom that require empirical testing include:

- "The poor will not pay for health care services."
- "The private sector is more efficient than the public sector in producing health services."
- "The private sector has no role in meeting the public health agenda."
- "Where the largest share of total health resources is spent on curative care, the allocation of resources is inefficient."
- "Social financing and risk-sharing schemes will not be effective in poor, rural areas."

A new body of research has begun to emerge that tests the validity of some of these common beliefs about health financing. For example, empirical studies of health care demand in developing countries have demonstrated that when given the choice, even the poorest often prefer to pay for better-quality health care rather than obtain free but low quality health services.

Public policy concerning health finance can greatly benefit from improved knowledge about such issues as the willingness of people to pay for health services, the relative efficiency of public and private providers, private sector roles, and the cost-effectiveness of investment in curative and preventive care. Yet despite the greater attention recently given to applied research in health finance, large gaps in knowledge remain.

AN AGENDA FOR APPLIED RESEARCH

HFS applied research seeks to advance knowledge in key policy areas and to develop analytical capabilities among developing country researchers. The research is designed to address key policy questions, explore neglected areas of research, improve analytical methods, and test new methodological techniques. With the review and advice of an external Technial Advisory Group, the project identified four broad areas of inquiry where major applied research was warranted: cost recovery, productive efficiency, social financing, and the private sector. To meet AID contractual requirements, the project also identified nine specific topics within these categories (see box).

HFS MAJOR APPLIED RESEARCH: AREAS, TOPICS, AND QUESTIONS		
Research Area	**Phase 1 Research Topic**	**Main Research Question**
COST RECOVERY	Quality of Care	Willingness to pay for improvements in quality
	Protecting the Poor	Design of equitable cost recovery systems
	Efficiency in Consumption	Design of monetary and other mechanisms that promote efficient patterns of demand for care
PRODUCTIVE EFFICIENCY	Pubic Sector Reform	Feasibility of improving efficiency in production through personnel incentives
	Reallocating Public Sector Spending	Definition of optimal allocation pattern and appropriateness of current allocation patterns
SOCIAL FINANCING	Expanding Its Role	Feasibility of risk-sharing for the poor
PRIVATE SECTOR	Development of Private Health Care Markets	Determinants and implications of private sector development
	Public-Private Differences in Efficiency	Existence of differences in productive efficiency between government and private providers
	Public-Private Interactions	Feasibility of socially beneficial collaboration between government and private sector

HFS conducted literature reviews (Phase 1) for all but one of these nine topics (the exception was reallocating public sector spending). At AID's request, an additional field research topic—an assessment of the economic impact of malaria—was also studied. Field research has been conducted (Phase 2) and analytical papers have been written (Phase 3) in all four of the major research areas. These cover the six specific topics as follows:

- Willingness to pay for improvements in health service quality in the context of cost recovery
- Impact of health service quality improvements on costs, efficiency, and demand
- Efficiency of public sector health services
- Comparison of public and private sector efficiency in health service delivery
- Impact of social financing of health services on demand, equity, and sustainability
- Development of private sector health services
- Economic impact of malaria

In addition to these applied research papers, HFS has produced a wide array of research instruments and data bases. (A list of these is provided in a separate project document, "Research Instruments and Databases of the Health Financing and Sustainability Project.")

POLICY-ORIENTED APPROACH TO APPLIED RESEARCH

HFS has conducted all the field research activities with active collaboration and involvement of local researchers and decisionmakers. In addition, when considering alternative field sites for major applied research, HFS sought to identify opportunities where research results would feed directly into the policy reform process.

In Niger, for example, HFS provided technical assistance to the government to test two cost recovery systems for curative care in ambulatory public facilities: a fee-per-episode of illness and a household tax with a copayment. Major applied research was conducted to assess and compare key indicators under the two financing systems, including the improvements in quality of care, the costs of quality improvements, people's willingness to pay for quality improvements, and equity implications of the financing methods. Research activities were intertwined with technical assistance to design and implement improved management systems for health facilities, new management procedures for clerical personnel, and improved diagnostic and treatment practices for medical staffs.

In Senegal, HFS conducted applied research to assess various dimensions of the current health system, including the legal and regulatory framework of health financing; the effectiveness of village health committees; the costs, financing, and efficiency of public and private providers; the size, role, and evolution of the private sector; and the demand for health care. The government of Senegal is planning major regional demonstration projects to implement some of the recommendations that emerged from this research.

All HFS major applied research products undergo a formal review process that involves project staff, external experts from academic and international institutions, and members of the project's Technical Advisory Group. HFS seeks excellence in its products and welcomes comments or suggestions about its research work.

If you have questions or comments about our applied research work, please contact the Technical or Applied Research Directors. For information about or to order written HFS products on research, technical assistance, and training, please contact the project's Information Center.

Ricardo A. Bitran
Director of Applied Research

EXECUTIVE SUMMARY

Poor economic trends in many developing countries have motivated policymakers to consider cost recovery in the health sector, a mechanism whereby patients pay part or all of the cost of care in a public facility, as a means of sharing the burden of financing between the public and the private sector. A recurring lesson from initial experiences in cost recovery is that without visible and fairly immediate improvements in the quality of care provided, patients will not support the implementation of user fees. This report represents Phase III of a component of the United States Agency for International Development (USAID) Health Financing and Sustainability (HFS) Major Applied Research on "Cost Recovery and the Quality of Care." As stated in the HFS Applied Research Agenda (1991), the goal of research in this area is to enhance understanding of the interrelationship of cost recovery and quality improvements.

Research Questions

This report focuses on empirical evidence from a cost-recovery pilot project in Niger about the economic impact on patients of new user fees in combination with quality improvements. The main research question was: How did the total cost of an episode of treatment for an acute illness for a typical patient change when user fees were imposed but accompanied by an improved drug supply? It could be that cost recovery accompanied by an improved drug supply reduced the total cost of an episode of treatment for a patient by eliminating additional travel to pharmacies that sold higher priced drugs. Individuals might substitute away from other more costly sources of care when they visited providers who also provided drugs. This question was posed not only for the typical patient, but also for four subgroups of patients including the poorest, children, females, and malaria cases.

Study Design

The Niger study was unique in that it provided a rare opportunity to document, in a rigorous manner, a variety of changes resulting from the actual implementation of a cost recovery intervention. Extensive household and facility data were collected before and after the implementation in two intervention districts and a control district.

Total costs of an episode included user fees, prepaid health taxes, costs for transportation, food and lodging, and the opportunity costs of the time involved in obtaining care. Two user fee systems were investigated. In one district, the patient paid a lump sum per one-week episode. In the other district, the patient paid an annual earmarked health tax and a small copayment per episode.

Analysis

The empirical analysis followed two approaches, both of which focused on comparisons between patient episode costs in the two intervention districts and the control district. The first approach consisted of simple comparisons of average episode costs for different population groups, referred to as comparisons of "unadjusted" episode costs. The second approach included econometric techniques to account for abnormal

distribution of patient episode costs, to address the individual's decision process for incurring health expenditures, and to adjust for the fact that the baseline and follow-up household surveys, although random, covered different households in each period. The latter approach generated "adjusted" episode costs.

Results

With one exception, the comparisons of both the unadjusted and adjusted patient episode costs showed that patient episode costs in the intervention sites increased *relative* to the control site. The exception was for differences between the intervention and control sites which were not significant between Say and Illéla for total adjusted episode costs for children. The two empirical approaches showed mixed results when comparing Say and Boboye in the changes they experienced relative to the trends in episode costs in Illéla. Using unadjusted episode cost averages, Boboye experienced a greater percentage decline than Say for the general population, for the poor and for children under 15; an equivalent percentage decline for malaria-like cases; and a smaller percentage decline for females. In contrast, using adjusted episode costs, Boboye had relatively higher increases in episode costs than Say for all population groups.

The results showed that cash costs accounted for about 90 percent or more of total episode costs in both the pre- and post-test periods. Opportunity costs were quite low both because the time required, on average, was an hour or less and because the value of time was low. The level of opportunity costs did not show any significant changes in Say and Boboye and declined in Illéla.

In Say, it appeared that patients in the study populations were incurring lower opportunity costs for home care and higher opportunity costs for facility care. Patients seemed to be spending more time traveling to facilities to benefit from the availability of drugs. Cash costs related to home care were also falling. Changes in facility cash costs were mixed, but increasing slightly overall. Substitution of facility care for home care was evident.

In Boboye, the level of opportunity costs increased for both home and facility-related care. Both home and facility cash costs fell, but were partially offset by tax payments. Facility cash costs plus the tax costs were roughly equivalent or somewhat more than facility cash costs incurred before the intervention (especially for females and the poor). Home cash costs fell the most, accounting for the overall drop in episode cash costs.

Home-related costs accounted for about 60 percent or more of episode costs in the pre-test period. After cost recovery, the proportion of home-related expenses decreased in all three districts, but remained a substantial portion (more than 50 percent). This pattern was evident looking at both total costs and cash costs. Even after the implementation of the intervention, patients still relied heavily on home-related treatment.

To summarize, the basic descriptive statistics provided useful information on both the level and composition of costs. The econometric analysis confirmed the general trends for the comparisons of total patient episode costs between the control and intervention sites. The results suggest that the proposed explanation that cost recovery accompanied by an improved drug supply reduces the total cost of an episode of treatment, by eliminating additional travel to pharmacies that sold higher priced drugs, was only partly at work in Niger. Some substitution from home care and associated pharmacies to facilities was taking place. However, overall episode costs rose relative to the control site. The likely explanation is that before the intervention, the health care system had seriously deteriorated. This deterioration continued in Illéla, but in other two districts, the infusion of resources almost inevitably meant that patients would be spending more.

The comparisons between Say and Boboye provided more mixed results. The basic descriptive statistics showed that, in terms of trends of episode costs, neither type of payment system was unequivocally the better alternative. Changes in episode costs occurred differently for different population groups. The econometric results were similar for females, but not for the other population groups. In health care financing research, both in the U.S. and other countries, getting such mixed results is not unusual. It is well known that health care financing initiatives have varying effects across different population groups and should be closely monitored in each local context. Also, ocassionally, different statistical methods generate different results. The choice of which set of results to use is not always clear, especially when new statistical methods are being explored and tested as in this report. Over time, with continued monitoring and evaluation and periodic in-depth analysis, the long-term impacts of the innovative cost recovery system should become clearer.

Policy Recommendations

These results showing increases in costs relative to the control site heighten the need for policymakers to carefully consider whether the benefits associated with these different payment methods justify these new costs to patients. Based on evidence from a related report *(Yazbeck et al., 1994),* utilization of public health care services increased in Boboye and was stable in Illéla during the pilot tests, demonstrating patients' willingness to pay for the quality improvements. The implication of these findings is that to ensure the long-term sustainability of these results, policymakers should explore what other quality improvements, in addition to the availability of essential drugs, are medically important and preferred by patients. More effort should be placed on measuring and monitoring these quality improvements over time and among providers. Although patients were willing to pay higher episode costs for some quality improvements, the assumption was that the money being collected would contribute to the maintenance of these improved services. Policymakers should ensure that adequate financing and financial management systems are in place to sustain quality improvements; otherwise, willingness to pay these higher episode costs will disappear. Clearly, the cost implications of quality improvements must be well known.

Future Research Recommendations

The following recommendations for research focus on areas highlighted by this specific study:

1. Future research should attempt to identify other quality improvements which have public health merit and are perceived to be important by patients. Measurement of these quality attributes should be improved (structure, process, outcome) so that they can be monitored over time.

2. It would be valuable to collect complete episode-of-illness cost information. This study was limited by the fact that episode costs covered a two-week period of time, truncating costs either at the beginning and/or the end of the episode.

3. In order to be able to attribute cost changes to differences in payment methods, it is important to improve classification of patients by type of diagnosis and risk. Future research should explore methods for improving the collection of such information which are feasible yet valid and reliable.

4. Future research should pay more attention to the cost consequences of various payment methods. To date, the focus in developing countries has been on the effects of user fees on utilization patterns; this is important but incomplete.

5. The experimental design used for this pilot project provided extremely valuable information for monitoring and evaluating actual experiences with cost recovery and quality improvements. Future research should continue to explore the use of experimental design evaluation methods with health care financing initiatives, recognizing that such extensive data collection may not always be feasible. Feasible yet informative data collection methods should be developed and tried.

6. Research methods for comparing changes in episode costs over time in a quasi-experimental design setting should be further developed. The results of this study showed that descriptive and multivariate techniques can lead to somewhat different conclusions.

1.0 INTRODUCTION

Poor economic trends in many developing countries have often resulted in substantial reductions in government budgets for health. This has led policymakers to rethink the role of the public and private sector in financing health care services; in particular, several developing countries are considering the implementation of cost recovery, a mechanism whereby patients pay part or all of the cost of care in a public facility as a means of sharing the burden of financing between the government and private households. In several cases, patients pay for essential pharmaceutical products, primarily medicines, otherwise not available in public premises. The creation of drug revolving funds, as this arrangement is usually known, has become common practice in the sub-Saharan region, particularly since the start-up of the UNICEF-supported Bamako Initiative in 1987.

There is fairly good evidence that patients are willing to pay for health care services when the quality of those services is improved. However, there is no information about how total patient treatment costs change as a result of various user fee payment mechanisms and there is also concern that not everyone will be able to afford these costs. Several studies suggest that although patients, on average, do not substantially change the choice of their health care providers when user fees increase, the poor seem to be more sensitive to price increases *(Gertler, et al., 1988)*.

Some suggest that the increase in private expenditures resulting from cost recovery might partially be offset if the accompanying quality improvements generate not only health but economic benefits *(Creese, 1991)*. For example, it could be that cost recovery accompanied by an improved drug supply reduces the total cost of an episode of treatment for a patient by eliminating additional travel to pharmacies that sell higher-priced drugs. Individuals may substitute away from other more costly sources of care when they visit providers who also provide drugs. Empirical evidence from the few existing studies, in combination with other anecdotes, lend mixed support to an increasingly posited hypothesis that some quality improvements (especially improved availability of essential drugs) which have economic benefits could partially offset the financial consequences of higher user fees *(Litvack, 1993)*. This might be true even for the poor, especially if the quality improvement increases accessibility and charges fees based on ability to pay .

For a cost-recovery pilot project in Niger, this study investigated how total patient treatment costs changed when new user fees in combination with quality improvements, primarily in the form of better drug availability, were implemented. The major research question was: How did the total cost of an episode of treatment for an acute illness for a typical patient change when user fees were imposed but accompanied by an improved drug supply? This question was posed not only for the typical patient, but also for four subgroups of patients including the poorest, children, women and girls, and malaria cases.

The Niger study was unique in that it provided a rare opportunity to examine the impact of an actual cost-recovery intervention using quasi-experimental design techniques. Extensive household and facility data were collected before and after the implementation of the intervention, in two intervention districts and a control district.

Total costs of an episode of treatment included the user fees, prepaid health taxes, costs for transportation, food and lodging, and the opportunity costs of the time involved in obtaining care. Two user fee systems were investigated. In one district, the patient paid a lump sum per episode each time he or she was ill. In the other district, the patient paid an annual earmarked health tax and a small copayment per episode.

2.0 APPLIED RESEARCH PROGRAM

This report represents Phase III of a component of the U.S. Agency for International Development (USAID) Health Financing and Sustainability (HFS) Major Applied Research on "Cost Recovery and the Quality of Care." Phase I consisted of a review of concepts and literature and preliminary field work design (Wouters, 1993). In Phase II, field work was conducted and data were collected. Phase III includes empirical analysis and formulation of policy recommendations.

As stated in the HFS Applied Research Agenda (1991), the goal of research in this area is to enhance understanding of the interrelationship of cost recovery and quality improvements. The scope of the topic is enormous as exemplified by the multitude of related research questions posed in the HFS Research Agenda, which are summarized below.

2.1 DEMAND-SIDE ISSUES

1. How do consumers view quality in choosing source and amount of care purchased?

2. For which improvements in quality are consumers willing to pay? Do patients perceive that they are getting "value for their money"?

3. What is the potential of quality improvements for increasing use by selected vulnerable groups?

4. Do providers' and consumers' perceptions differ?

5. How can consumer education affect perceptions of quality?

6. What are the distributional effects of improved quality; that is, how do different population groups view quality? (i.e. by income groups, gender, age, education)?

2.2 SUPPLY-SIDE AND OTHER FINANCING ISSUES

7. How do providers view quality?

8. How much do quality improvements cost?

9. To what extent can improvements in quality be paid for through user fees or related mechanisms?

10. What improvements in quality are required to facilitate cost recovery in the public sector?

11. How can quality be improved?

As stated in the Introduction, this study contributed to answering a subset of these questions, especially numbers 2, 3, 6, 9 and 10. Examination of changes in total patient treatment costs showed whether

patients were in fact paying more for their care under this cost recovery initiative and how payments for acute illnesses differed across various target groups. In combination with results from related studies on utilization, this study solidified understanding of whether target groups were willing to pay for the improved availability of essential drugs at payment levels sufficient to cover the cost of the drugs.

3.0 LITERATURE REVIEW

The Phase I report from this major applied research project concluded that there is substantial empirical evidence that quality of care is important in stimulating the demand for health care services *(Wouters, 1993).* Several studies were cited that found that quality of health care was an important factor in choosing a health care provider and that patients were willing to pay for improvements in quality *(Denton et al., 1991; Akin et al., 1981, 1986a,b; Heller, 1982; Mwabu et al., 1993; Lavy and Germain, 1993; Ellis and Mwabu, 1991).* Most of the studies indicated that the strongest preference was for the availability of drugs, both amounts and types of essential drugs. Preferences for building infrastructure and type of health providers were weaker, but apparent.

Studies of the Central African Republic and Tanzania, which surveyed patients on what they would be willing to pay if specific aspects of quality were improved in the future (contingent valuation methods), found that patients intended to pay for quality improvements, especially for pharmaceuticals, and that these amounts were quite substantial *(Weaver et al., 1993; Abel-Smith and Rawal, 1992).* Strikingly, rural populations exhibited strong intentions to pay for improved services.

Another study investigating a cost-recovery pilot project in Cameroon using experimental methods also found willingness to pay for quality improvements *(Litvack, 1993).* The intervention consisted of an increase in user fees and an improvement in the availability of essential drugs. The results showed that the probability of using the health center increased significantly for people in the intervention areas compared to those in the control areas. The evidence also indicated that the probability of the poorest income quintile seeking care increased at a rate proportionately greater than the rest of the population.

Litvack went on to test a possible explanation for these utilization patterns. Specifically, she tested whether there was a significant difference in the total costs for an episode of care before and after the cost-recovery intervention for an average patient and for the poorest quintile. Total costs of an episode included the direct costs of obtaining care at the health care facility, transportation costs and the opportunity cost incurred as a result of travel, waiting and treatment time. In these calculations, the costs for both the patient and accompanying family members were included. She found that health expenditures per episode of illness did not change significantly with the intervention, suggesting that individuals were substituting away from higher cost providers previously used. In this case, the improved availability of essential drugs which accompanied the user fees seem to have resulted in net cost savings, even for the poor.

The Litvack study made an important contribution to understanding why some quality improvements might be preferred. In this case, the hypothesis was that improved drug availability resulted in economic benefits. It remains to be seen whether such economic benefits from improved drug availability exist in other countries. Further research is needed to test these results in other countries with methodologies which generate more efficient estimates.

The Phase I report concluded that, except for the Litvack study, little research had been conducted to determine whether preferences for quality improvements varied across various target groups and if so, why. A health care demand study in Kenya tested whether men's preferences for specific aspects of quality differed from women's *(Mwabu et al., 1993).* The results suggested that men have a greater demand for anti-malarials than women, holding everything else constant. The Lavy study of health care demand in Ghana looked at

willingness to pay for three different income groups. The results indicated that willingness to pay increased with income. In looking at preferences for three provider attributes: quality of care (infrastructure, drug availability, services and personnel), distance, and price, the study found that the richest were more concerned with the quality of health services than their costs.

Building on the Litvack study, this research focused on estimating potential cost-savings incurred by patients during a cost-recovery pilot project in two districts in Niger, where increases in user fees were accompanied by improved drug availability. Changes in episode costs were investigated for the average patient as well as for various target groups including the poor, children under fifteen, women and girls, and malaria cases.

4.0 THE PILOT PROJECT

The Niger Ministry of Health, with the technical assistance of USAID and the AID country mission and with a grant from the World Bank for start-up inventories of pharmaceutical products, implemented a pilot project in cost recovery which included both the implementation of user fees and improvement in drug availability in about 20 Ministry of Health ambulatory facilities in three districts. The pilot projects began in May 1993 with potential for expansion after one year. The experiment took place against a backdrop of declining nationwide utilization of both pharmacies and government health facilities. The new system included four major components. First, diagnostic-treatment protocols using generic brands of essential drugs were implemented. This would reduce the costs of medicines in the delivery of primary health care. The second component consisted of improved drug supplies through a World Bank project. The third component was to improve management systems and capabilities. The fourth component consisted of installing two different systems for mobilizing additional resources at non-hospital facilities.

Boboye, in the Department of Dosso, adopted a form of social insurance consisting of an earmarked head tax combined with a small copayment per episode of illness (within a one-week period). The district health tax surcharge was 200 FCFA per taxpayer with a copayment of 50 FCFA per adult and 25 FCFA per child. It should be noted that this differed from traditional forms of insurance: it covered non-catastrophic care and was essentially a prepayment for treatment of acute illnesses at public ambulatory care facilities. The small copayment provided a deterrent to moral hazard (demand for unnecessary care in the sense that its marginal value proxied by a reduced price is less than its marginal cost) but might not eliminate it. The tax payment covered services rendered only at public facilities; visits to private facilities (traditional and western) had to be paid in full. At the time, choice of public or private provider was not a major issue since private providers were few, but it would be a factor to consider if the private provision of care were to be encouraged.

Say, in the Department of Tillabery, increased private financing through a fee-per-episode system, whereby the patient paid a lump sum each time he or she was ill (200 FCFA for adults and 100 FCFA for children under five). This system contrasted with fee-for-service where every additional visit, test, medical supply or medicine was charged for. In this case, risk was shared between the provider and the patient in the sense that the fixed lump sum was intended to cover all services for the episode of illness during a one-week period. Such a system should have encouraged patients to return for follow-up visits. There was some danger that providers would cut corners in quality to contain expenses within the fixed payment.

Illéla, in the Department of Tahoua, was selected as the control site where no cost recovery was implemented. All services were provided free at public facilities, although patients still incurred other travel and time costs.

The Government of Niger continued to provide current levels of subsidization to the intervention facilities, including the payment of personnel salaries. The World Bank funded initial stocks of pharmaceutical supplies and recurrent partial subsidies to replenish these stocks. In the long-term, drug prices would have to be increased to cover costs.

In Boboye, the diagnostic and treatment protocols were put in place in 1989, about three years before the implementation of cost recovery. At the time of the baseline survey, Boboye health personnel had

substantial experience with these protocols in contrast to personnel in Say where these protocols were introduced at the time when the cost-recovery tests were instituted.

Officials collected the head tax in Boboye in early 1991, about two years before the implementation of the user fees and drug distribution aspects of the intervention. Ideally the head tax would be collected annually; however, a variety of factors delayed the start-up of the intervention. In the second half of 1992, management information systems were established in Boboye and Say to better track drug supplies, utilization and financial activities. After the start-up of the intervention in May 1993, monthly facility data were collected to measure changes in revenue, quality of care, utilization and pharmaceutical product stocks. At the same time that management systems were improved, health workers in these districts were trained in selected primary health care diagnostic and treatment protocols. No incentives were provided to pilot test personnel.

Some exemptions were granted, but means testing was performed. The formal procedure for granting exemptions was to refer those claiming inability to pay to some regional or local committee which extends a certificate of indigence if the case is deemed legitimate. This occurred infrequently.

5.0 THE STUDY DESIGN

The evaluation of the pilot project was based on data collected using experimental design, where data were collected before (pre-test) and after (post-test) the initial implementation of cost recovery in districts. To compare behavior with and without the intervention, similar data were collected in districts with (intervention site) and without the cost-recovery intervention (control site). The control district, Illéla, and two intervention sites, Boboye and Say, were chosen non-randomly by the Ministry of Health. To facilitate logistics and implementation of follow-up activities, districts close to Niamey were chosen. These districts did not represent the diversity of socio-economic, cultural, and economic conditions which exist in Niger since they were chosen primarily because of their proximity to Niamey; however, it is believed that they did provide data typical of the country's rural environment.

Household surveys were conducted six months before (November 1992) and six months after the intervention (November 1993). These surveys were conducted independently in each district in order to be able to compare them two by two. The intention was to conduct the post-test one year after the intervention, but for a variety of reasons, this was not possible. This limited the analysis to investigation of short-run impacts. However, conducting the pre- and post-tests during the same part of the year (October—November) strengthened the comparability of pre- and post-test utilization measurements since seasonal illness patterns were held constant.

The household surveys included four components: (i) household questionnaire, (ii) curative questionnaire, (iii) preventive questionnaire, and (iv) income questionnaire. This study used data from instruments (i) and (ii).

The randomization process was based on the General Census of the Population of 1988 and on the 1988 update on the distribution of health installations in Niger. For each of the three districts, two stratum were created: one stratum with a health facility for which five census districts were included; one stratum without a health facility for which 29 census districts were included. Such stratification improves the comparability of samples obtained in different districts in terms of utilization patterns. Within each stratum, the households surveyed were selected according to a three-stage stratified cluster sampling design. At the third stage of selection, one in four households was selected randomly.

The same sample clusters, but different households, were used in the pre- and post-tests. The sampling procedures described in the previous paragraph were used each time so that the samples would be representative of the same population, but the same individuals were not interviewed in both surveys. For this reason, the pre-test and post-test groups were not directly comparable. Statistical methods had to be used to adjust for potential socio-economic and demographic differences in the pre- and post-test groups *(Cook and Campbell, 1979).* For the baseline survey, 612 households were surveyed in each district. As shown in ***Exhibit 5-1***, the number of individuals interviewed was 5,571 in Boboye, 4,723 in Say, and 4,116 in Illéla. In the final survey, 612 households were interviewed. The number of individuals interviewed was 4,850 in Boboye, 4,221 in Say, and 3,980 in Illéla. Approximately 21 percent in both the baseline and the follow-up survey reported an illness in the past two weeks (about 2,800 individuals each period).

EXHIBIT 5-1
SAMPLE SIZES

	SAY		BOBOYE		ILLÉLA	
	PRE-TEST	**POST-TEST**	**PRE-TEST**	**POST-TEST**	**PRE-TEST**	**POST-TEST**
Full sample size	4,723	4,221	5,571	4,850	4,116	3,980
# reporting any illness	653 (14%)	853 (20%)	1,353 (24%)	945 (20%)	899 (22%)	928 (23%)
# reporting acute out-patient illness (including injuries/hospital)	575	787	1,204	861	830	845
# treatment sought	281 (49%)	346 (44%)	666 (55%)	543 (63%)	320 (39%)	280 (33%)
THOSE REPORTING TREATMENT SOUGHT						
Malaria-like symptoms	157 (56%)	179 (52%)	311 (47%)	293 (54%)	189 (59%)	134 (48%)
Female	129 (46%)	186 (54%)	366 (55%)	282 (52%)	157 (49%)	137 (49%)
≤ 15 years old	126 (45%)	186 (54%)	322 (50%)	255 (47%)	150 (47%)	129 (46%)
Lowest 45% p.c. exp.	121	148	259	230	135	124

Comparability between the pre- and post-test surveys could have been compromised if the household selection process was implemented in a biased fashion. This appeared not to have been a problem for the Niger study. The sample selection process was tightly supervised centrally by the resident advisor for the project. The demographic characteristics and disease patterns of the respondents revealed highly similar pre-test-post-test profiles in each site. This information is presented in the appendix, ***Exhibit A-1***.

In general, the study design eliminated the effects of a variety of factors occurring *simultaneously in all three districts* which could have clouded the interpretation of the episode cost comparisons. Such factors are referred to as history (specific events which might have occurred between the first and second household survey which are unrelated to the cost-recovery intervention), maturation (learning or growth by respondents as time passes), testing (second-round test results being influenced by previous experience with the identical instrument), and instrumentation (changes in how responses to questions are measured or calibrated).

However, the design might not have been able to control for interaction between these aspects and the specific selection differences of the intervention and control groups. A particular problem could have been the interaction between maturation and site selection: facility data suggested that health workers in Boboye and Say were quite different in their familiarity with a major component of the intervention, namely, the diagnostic-treatment protocols using generic essential drugs *(Diop et al., 1993).* At the time of the pre-test, Boboye personnel had already had over two years of years experience with these protocols; in Say, the protocols were yet to be implemented. According to facility-based data collected for the first six months of the pilot tests, the average amount spent on medicines per illness rose to 112 FCFA in Boboye and to 285 FCFA in Say. Although these figures did not control for adjustments in the cost of medicines, the lower amount in Boboye could have been due in part to the greater proficiency of health workers in following the protocols. Differences in the rate of adoption of these protocols between Say and Boboye could confound interpretation of the results. It might take some time for Say personnel to learn and adjust to these protocols; episode costs for medicines may continue to decrease in Say more than in Boboye, at least in the short-term.

Differences in intra-session history (site-specific events occurring between the first and second measurement including events related to and independent of the implementation of the intervention) did not appear to be a problem. The first six months of facility-level data on changes in revenue, quality of care, utilization, and pharmaceutical product stocks did not reveal any significant site-specific events except the differences in proficiency of using the protocols *(Diop et al., 1993).*

6.0 RECENT FINDINGS FROM THE PILOT PROJECT

This particular study was part of a larger project under which several analyses of the data were conducted *(Diop, 1993; Diop et al., 1993; Diop et al., 1994; Yazbeck et al., 1994).* Key findings from these studies are summarized here. Empirical information was collected on changes in utilization patterns before and after the intervention, patient preferences and perceptions of the user fee payment methods, and potential for and management of revenue generation.

6.1 UTILIZATION

According to Yazbeck et al. (1994) the probability of seeking treatment for illness or injury at a public facility for the average person increased in Boboye (the social financing district), did not change in Say (the fee-per-episode district), and fell in Illéla (the control district). For women and the poorest income quartile, health seeking behavior did not change in either of the intervention districts, but decreased in the control district. For children under fifteen and the elderly, utilization increased in the social financing district, remained stable in the fee-per-episode district, and fell in the control district.

The observed increase in utilization in Boboye was consistent with the improved quality in terms of drug availability and the potential for moral hazard. The social insurance plan included an out-of-pocket price which was less than the actual cost of care at the time medical care was purchased. This was shown, in other studies, to induce demand *(Phelps, 1992).*

The unchanging probability of seeking treatment in Say was somewhat unusual in light of findings from other African countries. Numerous examples exist where, in the short-run, the introduction of cost recovery resulted in reduction in use such as in Lesotho *(Matji et al., 1993)* and in Ghana *(Waddington and Enyimayew, 1989, 1990).* In some cases, utilization levels climbed back to pre-cost recovery levels after several more months. This was true in the urban areas of Ghana. A possible explanation for the stable utilization patterns in Say is that the negative effects of price on utilization were offset by the positive effects of quality improvements.

Falling utilization in Illéla were symptomatic of the deteriorating public health infrastructure. Health care conditions for women, the poorest income quartile, children, and the elderly appeared to be equally desperate.

6.2 PATIENT PREFERENCES AND PERCEPTIONS OF PAYMENT METHODS

The preferences summarized below were consistent with the utilization trends described above. Based on the analysis by Yazbeck et al. (1994), a vast majority (over 80 percent) of the people surveyed expressed strong desirability of cost recovery and improved quality over the previous health delivery system. In the post-intervention period, based on their actual experiences, a majority of patients declared a strong willingness to pay for improved drug availability; in fact, a large percentage (over 60 percent) were willing to pay more than currently set prices. About 25 percent did not want price increases.

A majority of respondents stated that they preferred the social financing over the fee-per-episode of illness method. These results should be interpreted with caution since users had actual experience with only one, not both, of the payment methods. Two major reasons were given: first, they perceived social financing to cost less; second, they found prepayment easier to finance, perhaps because of seasonal variations in income. The perceptions about cost somewhat confirmed the concern for moral hazard. Small copayments disassociated patients from real costs. The findings of this study empirically determined how treatment costs differed between payment systems; perhaps, patients had misconceptions about costs.

6.3 INVENTORIES OF DRUGS

Analysis of the facility inventory records indicated no major disruption in the availability of drugs at facilities during the first six months *(Diop et al., 1993).* Prescriptions of medicine increased substantially. The average value of medicines used, based on the first six months, was almost three times the usual six-month allowance for medicines allocated in the country's budget. In Boboye during the pilot project, ten public health facilities used medicines totaling 6,746,000 FCFA compared to a historical six-month budget of 2,240,000 FCFA. Say used 6,56,000 FCFA of medicines in five months of the pilot project compared to a historical six-month budget of 2,500,000 FCFA.

6.4 POTENTIAL FOR AND MANAGEMENT OF REVENUE GENERATION

Boboye generated higher overall receipts than Say, primarily because this district required payment from the entire population, not just users. In addition to the revenue from the prepaid tax, the fees drew in about 34 FCFA per new patient. In all, Boboye was able to earn through taxes and fees 120-180 percent of the cost of medicines, or 75-105 percent of the cost of medicines plus administration of the cost-recovery fee collection system.

In Say, average receipts per illness fluctuated between 150-160 FCFA. This covered about 50-55 percent of the costs of medicines or 35-40 percent of the amount spent on medicines and cost-recovery administration.

Social insurance was more effective at raising revenues, the bulk (75 percent) coming from prepaid taxes required of both users and non-users of public health facilities. In contrast, revenues generated by the fee-per-episode payment system were directly contingent on utilization and generated surpluses only if prices were set above unit costs. As shown in basic economic theory, short-run financial sustainability depended on setting prices which at least covered unit variable costs.[1] Remembering the previous result that a substantial portion of individuals were willing to pay more than current prices, it might be possible for facilities in Say to recover at least, if not more than, the costs of medicines (critical unit variable costs).

[1] This is known as the shutdown rule in microeconomics, or the contribution margin in managerial accounting.

A major concern remains about the management of revenues in both districts, namely, that legislation is not yet in place to formally recognize cost recovery. Without such legislation, public providers are not allowed to use revenues from cost recovery to support revolving funds. Official procedures for using health tax revenues are also lacking. Without legal mandates to use funds in support of the health system, cost recovery, by definition, cannot succeed.

7.0 CONCEPTUAL FRAMEWORK

7.1 WILLINGNESS TO PAY

Evidence from previous literature suggested that individuals might be willing to pay for improvements in the quality of their health care services because they benefited not only from better health outcomes and/or more pleasant visits to health care providers, but also from cost-savings generated by the improvement. Such behavior is consistent with a framework where health care services are valued for their contribution to health rather than for something in and of themselves. Health care services, in combination with several intermediate (proximate) determinants of health such as environmental sanitation and nutrition, have a direct influence on health. This framework has been used as the basis for several empirical investigations of health care demand in developing countries *(Bitran, 1989a,b; Gertler et al., 1989; Mwabu et al., 1993; Ellis et al., 1991).*

The general framework can be shown as:

Objective:
Utility of individual X is a function of:
(health status of X, consumption of non-health goods by X)

Health Production Function:
Health Status of X is a function of:
(age X, sex X, nutrition X, education X, consumption of health services by X, other proximate determinants of health consumed by X)

Budget Constraint:
Household income = (Amount of non-health goods x price of non-health goods)
+ (amount of health goods x price of health goods)

Solving the model yields the following general relationship where each input to health will be consumed up to the point where the marginal productivities (MP) per unit price for each input are equal:

$$\frac{MP \text{ (input 1)}}{\text{unit price}} = \frac{MP \text{ (input 2)}}{\text{unit price}} = \frac{MP \text{ (input 3)}}{\text{unit price}}$$

The implication is that the choice of health care provider is determined by the perceived marginal productivity per unit price relative to the marginal productivities per unit price of other health inputs. Willingness to pay for health care depends on the patient's perception of the marginal productivity per unit price of the particular health care provider to improved health. Patients want value for their money. They may consider both direct health outcomes and related psychic benefits (e.g. manner and attitude in which health care is rendered) in their perceptions of marginal productivity.

The decision rule given here presents the private rather than the social perspective. Individuals have their own set of priorities and are making their own choices about how to allocate their income. This does not necessarily mean that patients always have the correct knowledge of how efficacious treatments are or who the most appropriate providers would be. For example, it has often been observed that patients overly focus on drugs when other types of health care are more efficacious. Such patterns highlight the need to ensure that patients are kept well informed of their health service options. In cases where important social benefits are not

incorporated in private decisions (e.g. externalities such as control of highly communicable diseases), governments might intervene to encourage certain behavior (e.g. subsidization of immunization programs, quarantines). In cases of extreme poverty, individuals might be choosing between spending on basic necessities such as emergency health care, essential food, and basic housing. In this case, government, the community or other extended family members might intervene to donate income to or subsidize the price of the essential commodity for the poor household.

To summarize, the model focuses on individuals making their own choices, while recognizing that under certain conditions, social institutions such as the government, community or extended family might intervene to protect the welfare of the individual and society.

The general issue was: which improvements in quality of care increased the marginal productivity of health care for improved health (broadly defined in physical and psychic aspects) per unit price as perceived by the patient? Demand for these improvements in quality would increase even if patients had to pay for them, if the ratio of the perceived marginal productivity to price was still larger than for other health providers.[2] One could posit that patients perceived that the availability of drugs substantially increased the marginal productivity of health care. If availability of drugs at public facilities also reduced the total cost of an episode of treatment for a patient (eliminating additional travel to pharmacies that sell higher priced drugs), this would also have increased the marginal productivity of public health care per unit price.

This study focused on the denominators of the above relationship, patient episode costs, and not the full decision rule. Demand analyses would be required to assesses changes in perceived marginal productivities. One might assume that perceived marginal productivities increased with improved drug supply, but this is not necessarily so. The analysis attempted to answer the question: Did the total cost of an episode of treatment for an acute illness for a typical patient change when user fees were imposed but accompanied by an improved drug supply? This question was posed not only for the typical patient, but also for four subgroups of patients including the poorest, children under fifteen, females, and malaria cases.

To determine the impact of the two different cost-recovery interventions on the health expenditures incurred by patients for an episode of care, the study tested the hypotheses (stated as null) pertaining to changes in episode costs between intervention and control districts: (i) average episode costs in Say and Illéla (control) were not significantly different *after* the introduction of the cost recovery pilot intervention; and (ii) average episode costs for Boboye and Illéla (control) were not significantly different *after* the introduction of the cost- recovery pilot intervention. These were tested for general acute outpatient illnesses and the subset of malaria cases. Distributional impacts were investigated by testing the same hypotheses for the poor, females, and children under 15 years old.

7.2 QUALITY OF CARE

As the framework above suggests, quality of care is a multidimensional concept. This section explains key concepts about quality in health care to better understand the types of quality improvements implemented in Niger. It is well known that providers and patients do not always agree on what is good quality health care. Responsiveness of patient utilization to improvements in quality of care will depend on whether these improvements are easily perceived and preferred by patients.

[2] This points to the critical role of health education and health communication in increasing patient knowledge of how health care services contribute to health outcomes.

Many definitions of quality of health care services exist. No one definition of quality is applicable in all situations. Some definitions include:

> "The degree to which actual performance or achievement corresponds to set standards." *(USAID, 1991)*

> "The quality of technical care consists in the application of medical science and technology in a manner that maximizes its benefits to health without correspondingly increasing its risk. The degree of quality is, therefore, the extent to which the care provided is expected to achieve the most favorable balance of risks and benefits." *(Donebedian, 1980, p. 5-6)*

> "Proper performance (according to standards) of interventions that are known to be safe, that are affordable to the society in question, and that have the ability to produce an impact on mortality, morbidity, disability and malnutrition." *(Roemer and Montoya Aguilar, 1988).*

> "Doing the right thing, right away." *(Deming, Walton, 1986).*

Donebedian, well recognized for his comprehensive research in quality assessment and monitoring, proposed three levels for measuring quality: structure, process, and outcome (1980). Quality assessment of structural components looks at the physical settings in which care takes place (facilities, equipment, personnel and non- personnel resources, administration). Quality assessment of the process components compares what should be done with a given health technology with what is actually being done in terms of provider competence and user compliance (is good medical care being applied?). Quality assessment of outcome components examines whether a change in health status can be attributed to the health program or whether a patient is adequately satisfied with the health care provided. From these definitions, one can see that although it is hoped that improvements in structure and process measures of quality lead to better health outcome, it is not guaranteed. Each of these three measurements of quality in turn contains several important elements that may be perceived in different ways by the different groups involved—the Ministry of Health, users, other providers. The Phase I report provided more detail on these perspectives. Developing country studies typically focus on structural and some process attributes.

"Total Quality Management" methods, developed by Deming, offer useful terminology for further identifying quality attributes. "Quality of Design" pertains to the accurate translation of customer/provider expectations into the design specifications of the product or service. "Quality of Implementation" concerns the conformance of actual product or service delivery to the set design specifications or 'doing things right the first time'.

In the Niger intervention, quality improvements focused primarily on basic issues of Quality of Design and structural attributes. Specifications for diagnostic-treatment protocols were set and put in place through continuing education programs to health workers. Management systems were enhanced; personnel were trained in the use of essential drugs and drug and cash management systems. Most attention was placed on ensuring the availability of essential drugs, an improvement deemed to be important by providers and the Ministry of Health, and perceived to be desirable by patients. These improvements were, to some extent, less an issue of quality improvement (Quality of Design) than of concern for establishing the basic existence of a service.

Data collection on quality of care for the Niger study focused on structural measures of quality. In particular, facility-level instruments inventoried key resources including essential drugs and labor for the first six months of the intervention. Detailed empirical information on how well various treatment and management

processes were carried out was not collected; it is not known to what extent diagnostic-treatment protocols were actually followed. This would have required another fairly complex monitoring instrument requiring detailed task observations of providers and patients.

8.0 THE DATA

Exhibit 5-1 summarizes the sample sizes for the pre- and post-test household surveys in each of the three districts. In Say, full sample sizes were 4,723 and 4,221 for the baseline and follow-up surveys, respectively. Boboye sample sizes were 5,571 and 4,850 in the pre- and post-tests, respectively. Illéla samples were slightly smaller than either Say or Boboye at 4,116 and 3,980 in the first and second rounds, respectively. The response rates for the household interviews were 98 percent or better. Only a small percentage of those interviewed reported having an illness in the past two-week-recall period. In the pre- and post-tests, 14 percent and 20 percent of those interviewed in Say, 24 percent and 20 percent of those interviewed in Boboye, and 22 percent and 23 percent of those interviewed in Illéla reported an illness, respectively.

Of those reporting an acute illness, not all sought any kind of treatment, either home or outside care. In Say about 50 percent said they did anything about their illness. In Boboye, about 55 percent of those who were sick in the past two weeks reported getting some kind of treatment. Individuals in Illéla reported the lowest activity; 39 percent did anything about their illness.[3]

8.1 STUDY POPULATIONS

Ideally, one would have wanted to analyze changes in episode costs for specific diagnoses; however, detailed information on type of illness was not available. To minimize the heterogeneity in illnesses represented in the analysis, episodes requiring hospitalizations or dealing with injuries were dropped. In Say, only 12 percent and 8 percent of illnesses in the pre- and post-tests, respectively, were for injuries or hospitalizations. In Boboye, 11 percent and 9 percent of illnesses in the pre- and post-tests, respectively, were for these two types of care. Similarly, in Illéla, 8 percent and 9 percent of illnesses in the pre- and post-tests, respectively, were for injuries or hospitalizations. For each person reporting an outpatient illness in the past two weeks, episodes of treatment were categorized into an illness group by identifying a key tracer symptom and possible associated symptoms. For example, if a person reported a fever as a minimum, with possibly a headache or an eyeache, but without a cough or diarrhea, their episode of illness was categorized as 'malaria-like'. If a person reported liquid feces, perhaps with vomiting, stomach ache, blood in the stool, headache or eye ache, but without a cough or fever, their episode of illness was categorized as 'intestinal'. If a person reported a cough, with possibly a fever, headache, eye ache, or stomach ache, but without liquid feces, their episode of illness was categorized as 'respiratory'. This crude triage mechanism roughly differentiated three major illness groups. As shown in ***Exhibit 5-1*** malaria-like symptoms were most frequently reported, accounting for half of the acute illness episodes of treatment. Given the small sample sizes for the remaining three symptom groups, analysis of episode costs focused on either 'general acute illnesses' or the subset of 'malaria-like' illnesses.

The other study populations for the analysis were females, which accounted for about 50 percent of the acute episodes of treatment, children under fifteen which accounted for about 50 percent of episodes of treatment, and the poorest 45 percent. Selection of age limits and the 'poverty line' were dictated in large part

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[3] There is a substantial proportion of individuals who said that they sought treatment, but then indicate in subsequent questions that they did not receive care at home by health personnel, did not use medication at home, and did not seek care outside the home. For this study, these individuals are classified as not seeking treatment.

by obtaining a large enough sample size for the subgroup while still preserving the unique characteristic of the target group.

8.2 EPISODE COSTS—DEFINED

Initially it was hoped that the analysis could be conducted for completed episodes of illness, that is, those episodes which began and ended within the two-week period. However, few episodes qualified as 'completed episodes'. Because of these data limitations, the study included anyone who incurred any expense during the two-week recall period. Obviously, episode costs could be truncated either at the beginning and/or the end. It was assumed that truncation occurred randomly across the population.

The dependent variables for this analysis included total episode costs (EPCOST) consisting of cash and opportunity costs, and total episode cash costs (EPCASH). Costs included those incurred both at home (self-treatment or a home visit by some type of health worker/healer) and at health facilities. Cash expenditures consisted of payments for drugs and consultations at home plus payments for transportation, food and lodging, drugs and consultation fees at a health facility. In Boboye in the post-intervention period, cash payments also included a tax assessment; episode costs included that portion of the annual tax which could be apportioned to an episode.

The annual tax levied as part of the Boboye cost-recovery intervention was considered a prepayment for health services to be received during the year. Individuals 18 years and older were required to pay 200 FCFA. To calculate the tax per episode, three steps were required. First, the total tax paid per household was calculated by multiplying the number of individuals over 18 by 200 FCFA. Second, the per capita tax burden was calculated by dividing the household tax payment by household size. Third, it was assumed that individuals had, on average, two episodes of treatment per year. The per capita tax burden was divided by two to arrive at the episode tax.

EPCOST included both episode cash costs and opportunity costs (EPOC). The opportunity cost associated with home and facility treatment was defined as the income foregone when an individual spent time traveling and waiting for health care. It was assumed that for each episode one wage earner participated. If the episode pertained to a child, the child would be accompanied by an adult. If the episode pertained to an adult (over 15 years old), he/she would travel alone. This was reasonable for the set of acute outpatient illnesses under consideration. The value of time was proxied by the average hourly expenditure per adult in a household. Total monthly household expenditures were divided by the number of wage earners in a household (number of individuals over 15 years) to get a proxy for an average earnings rate per month. About half of household members were classified as wage earners. Monthly figures were converted to hourly rates by assuming 24 working days per month, 10 working hours per day. The limitations of this approach were that in African cultures individuals might measure the value of time in other ways than lost income (e.g. time away from family or other social commitments). Also, average monthly expenditures did not capture seasonal variations in income.

9.0 EMPIRICAL METHODS

The empirical analysis followed two approaches, both of which focused on comparisons of patient episode costs between the two intervention districts and the control district. The first approach consisted of simple comparisons of average episode costs for different population groups, referred to as comparisons of 'unadjusted' episode costs. The second approach included econometric techniques to account for the fact that the distribution of patient episode costs were not normally distributed, to incorporate concepts about the individual's decision process to incur health expenditures, and to deal with the nature of the baseline and follow-up household surveys which, although random, interviewed different households in each period. The econometric approach generated 'adjusted' episode costs.

In making comparisons of changes in the basic averages of episode costs during the pre- and post-test periods between the intervention and control sites, both the levels and composition of episodes costs were examined. Comparisons of means were done using the nonparametric Wilcoxon z test rather than the usual t-test because the distribution of expenditures was non-normal. In this case, a majority of the population incurred low expenditures with a few patients incurring very high expenditures.[4]

The econometric approach dealt with three major empirical issues. It is briefly summarized here, but a detailed explanation of the econometric analysis is left to the appendix. First, it considered how to model the individual's decision process for incurring health expenditures. In the previous literature there has been substantial discussion of the types of models which can be used to estimate health expenditures. The simplest empirical techniques used to predict expenses are analysis of variance (ANOVA) and analysis of covariance (ANOCOVA). Previous studies have shown that these methods yield highly imprecise results; they are not robust in the presence of high expenditure outliers and inefficient when the strong assumptions about distribution of variables are not met *(Duan et al., 1983)*. The Litvack study in Cameroon used this approach and did not find significant changes in health expenditures. The regression approach used here assumed that individuals first make a decision to incur positive expenses and then decide how much to spend, meaning that the two decisions can be analyzed separately. This approach was chosen because the focus was on the conditional population, that is, only those who chose to seek treatment; we were not attempting to make generalizations for the whole population.

Second, the econometric analysis used a set of factors to adjust total episode costs in order to make pre- and post-intervention comparisons between individuals and control sites. This was required because the pre- and post- test surveys interviewed different samples from the same populations. Four steps were required to make these comparisons between the three districts. The first step of the analysis answered the question: Before the cost recovery intervention was introduced, what total costs of an episode of treatment were expected for an individual with a certain illness condition and a specific set of socio-economic and demographic characteristics? The baseline survey was used to generate estimated relationships between episode costs and the covariates reflecting an individual's socio-demographic and economic characteristics,

[4] Because of the skewed nature of the distribution of expenditures, comparisons of the means of the untransformed expenses using t-tests are inappropriate. Instead, non-parametric tests which do not require normality assumptions are used to compare populations. The median test (where observations are dichotomized above or below the combined population median) is not as powerful as the Wilcoxon test in capturing differences in central tendencies and skewness (Siegel and Castellan, 1988, p.166).

illness conditions (symptoms and severity), and proximity to a public health facility. Three sets of coefficients were estimated, one for each district. In the second step, these district-specific estimated relationships reflecting baseline behavior were then used to predict the costs of an episode of treatment for individuals in the follow-up survey. These predictions answered the question: For those individuals who sought treatment after the intervention in each district, what total costs of an episode of treatment would they have incurred in the baseline period? In the third step, for each individual, changes in episode costs between the two survey periods were determined by comparing actual episode costs incurred by an individual in the follow-up period with his/her predicted baseline episode costs. Finally, in the fourth step, individual-level differences between pre- and post-test episode costs estimated in the third step were averaged for each district. Pairwise comparisons between each intervention site and the control site of the average differences in episode costs over time were made to determine whether patterns of episode costs under cost recovery differed from control conditions.

Third, the econometric analysis was based on logarithmic transformations of episode costs because the distribution of episode costs were non-normal. For those who incurred expenses, the distribution of expenses tended to be highly skewed with the bulk of individuals incurring small or moderate expenses and a few individuals spending very large amounts. Many studies, including the Litvack study, have used a natural logarithmic transformation of health expenditures to reduce the effect of high spenders, thus rendering the distribution more balanced (normal). Such a transformation was also important because the ordinary least squares regressions explained in the previous paragraph require normally distributed error terms.

10.0 RESULTS

As stated earlier, the results shed light on the two hypotheses (stated as null): (1) average episode costs in Say and Illéla (control) were not significantly different *after* the introduction of the cost recovery pilot intervention; and (2) average episode costs for Boboye and Illéla (control) were not significantly different *after* the introduction of the cost recovery pilot intervention. These were tested for general acute outpatient illnesses and the subset of malaria cases. Distributional impacts were investigated by testing the same hypotheses for the poor, females, and children under fifteen years old. The discussion below includes results from the analyses of both the unadjusted and adjusted episode costs.[5]

Interdistrict comparisons—general patterns:

As evident in ***Figures 1a,b through 5a,b***, with few exceptions, the comparisons of both the unadjusted and adjusted patient episode costs showed that patient episode costs in the intervention sites increased *relative* to the control site. Using unadjusted averages, episode costs declined in all three districts for almost all five population groups, but the declines in Say and Boboye were less than those in Illéla. (The general population in Say showed a 1 percent increase.) Looking at adjusted averages, episode costs increased in both intervention districts for almost all five population groups (except for episode cash costs for females in Say) in comparison to adjusted episode costs in Illéla which always declined except for total costs for children. For each district, the first three columns of ***Exhibit 10-1*** show log of average changes in charges for adjusted episode costs. The last two columns of ***Exhibit 10-1*** indicate whether changes in the intervention districts are significantly different from changes in the control district. The differences between the intervention and control sites were always significant except between Say and Illéla for total episode costs for children.

[5] Both adjusted and unadjusted episode cost averages include individuals who said they sought some kind of care, either at home or in a facility, but received free care (e.g. EPCOST = 0). ***Exhibit 1-4*** shows that as many as one-third of those who sought care, received free care.

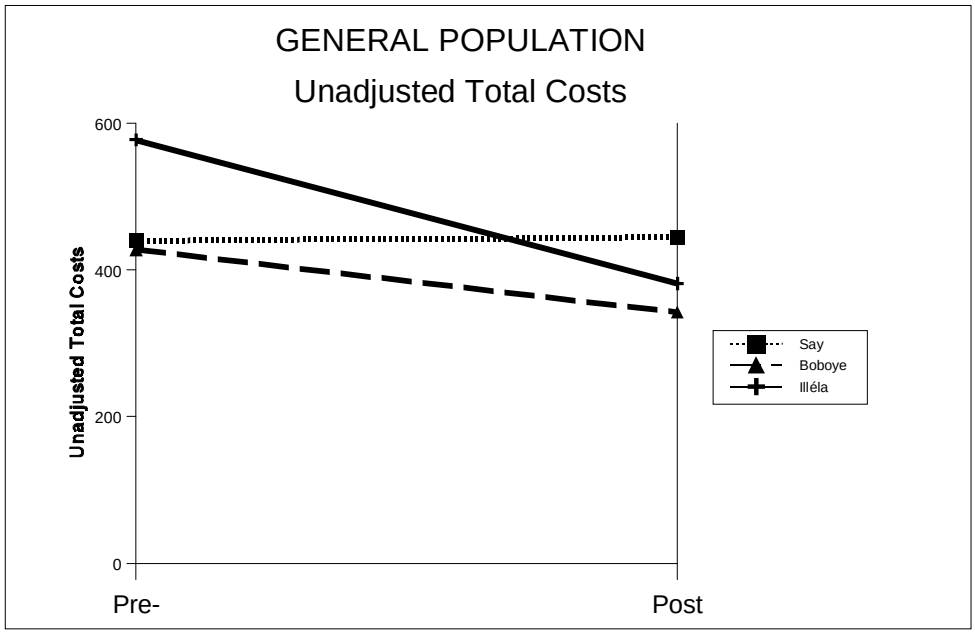

Figure 1a

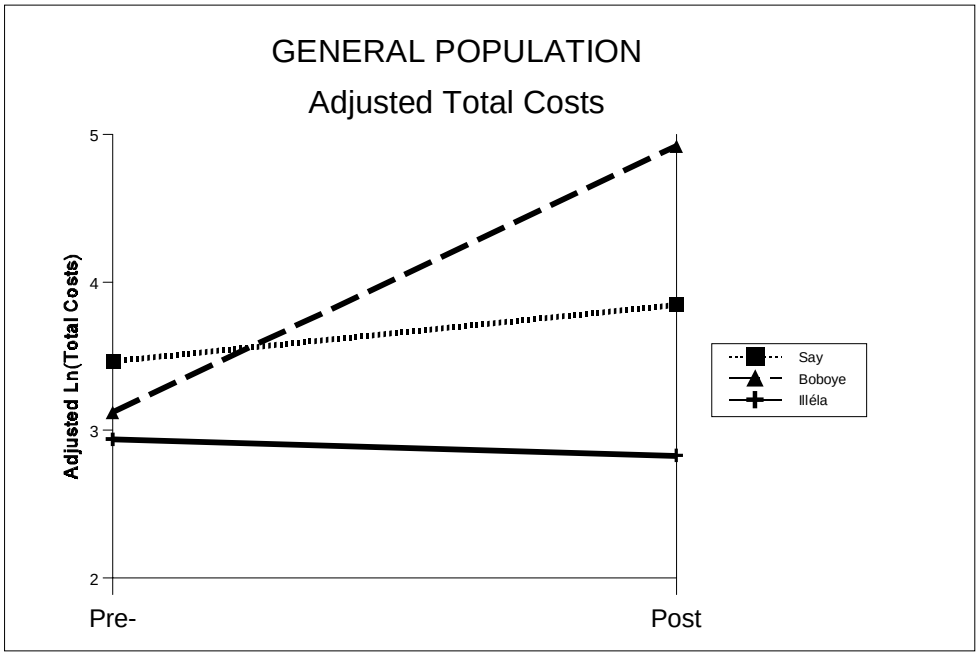

Figure 1b

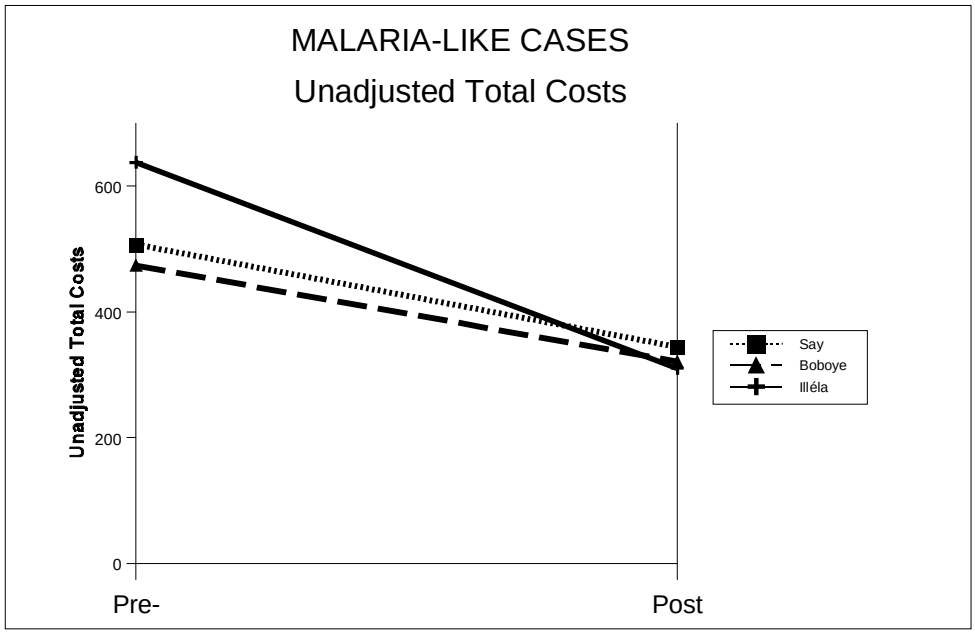

Figure 2a

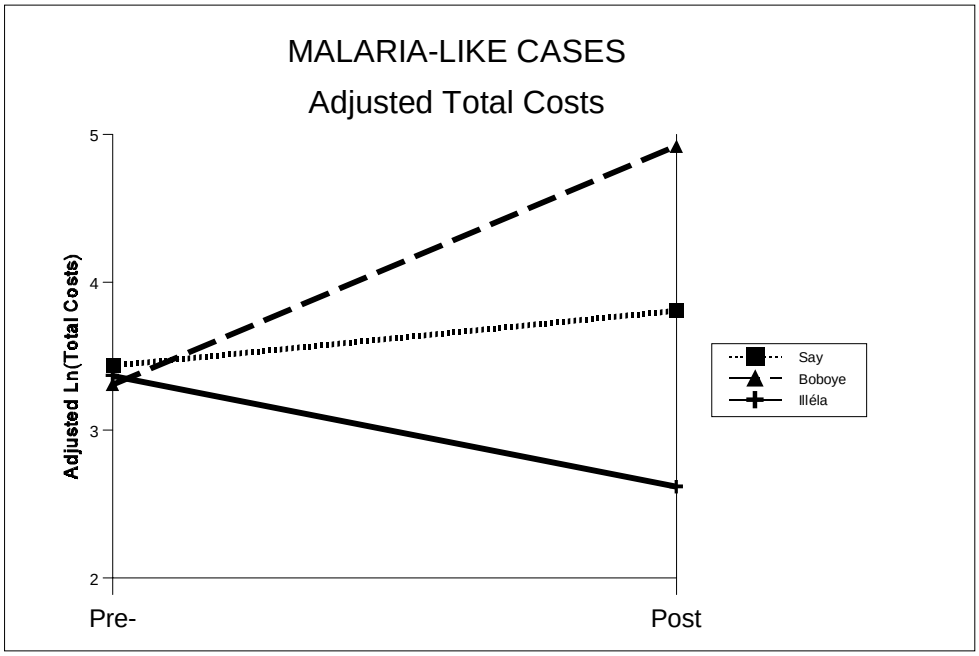

Figure 2b

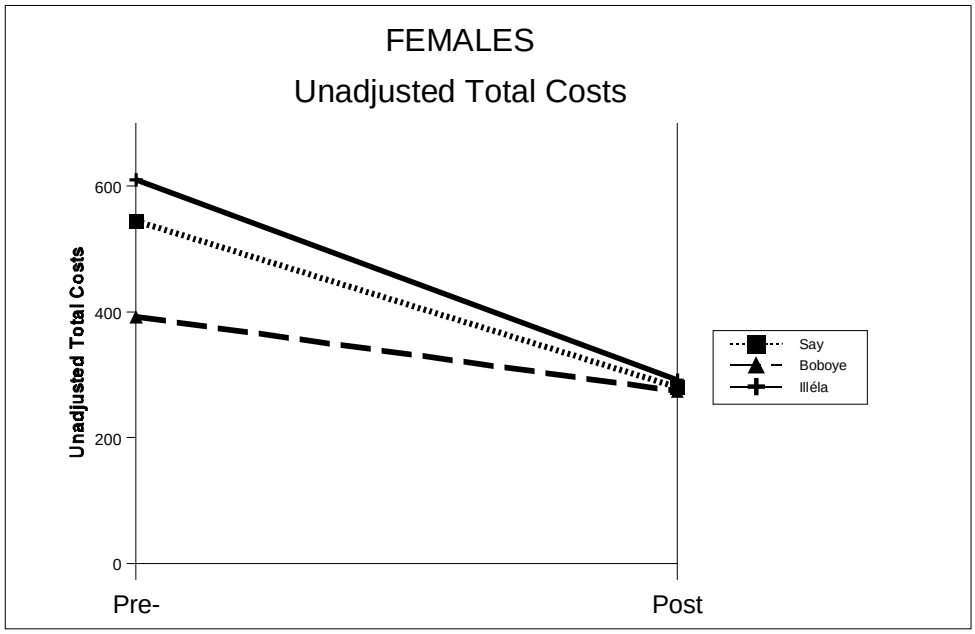

Figure 3a

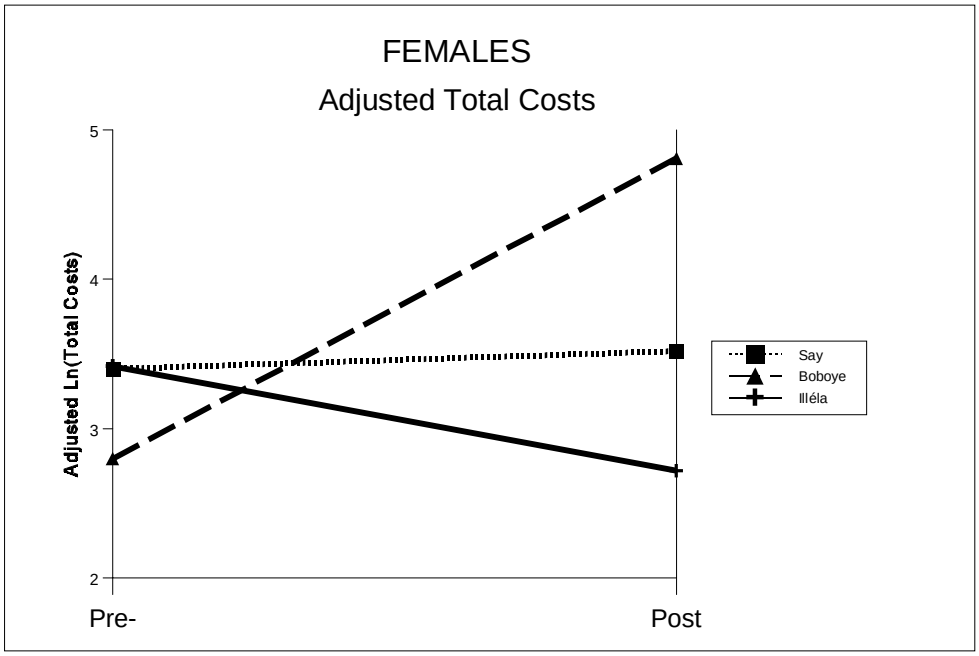

Figure 3b

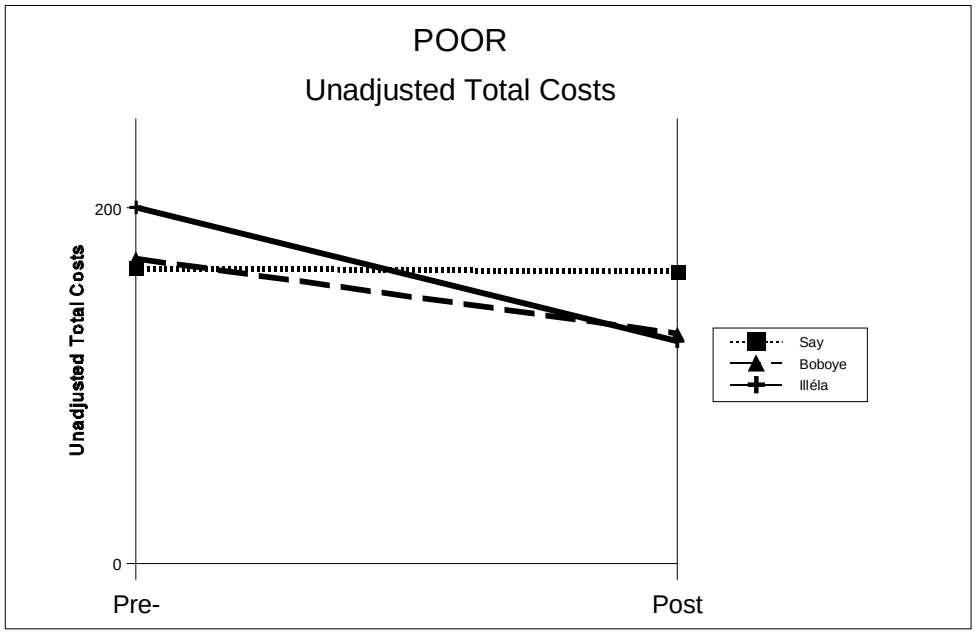

Figure 4a

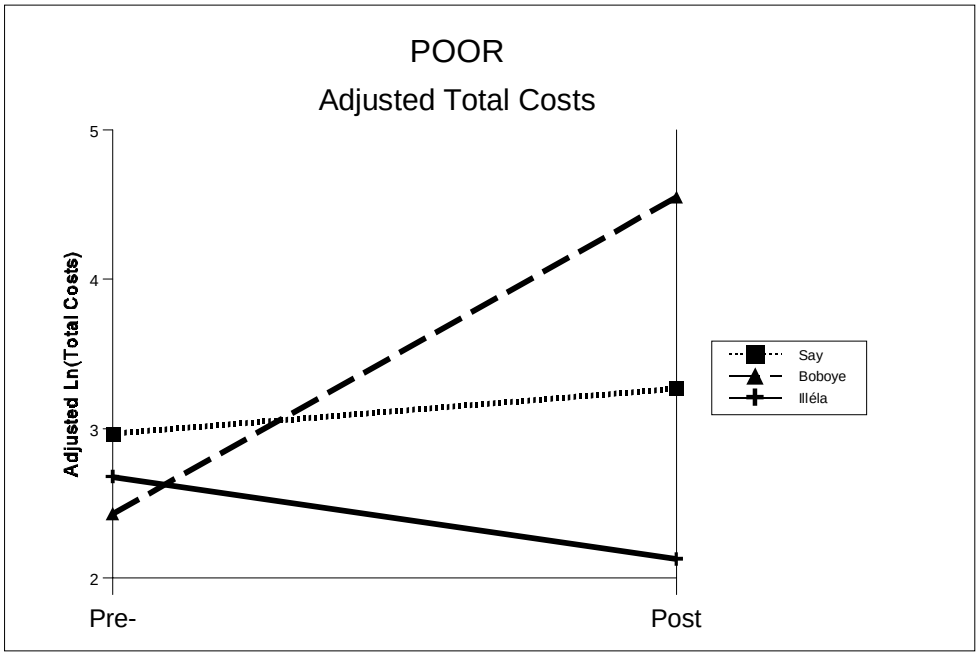

Figure 4b

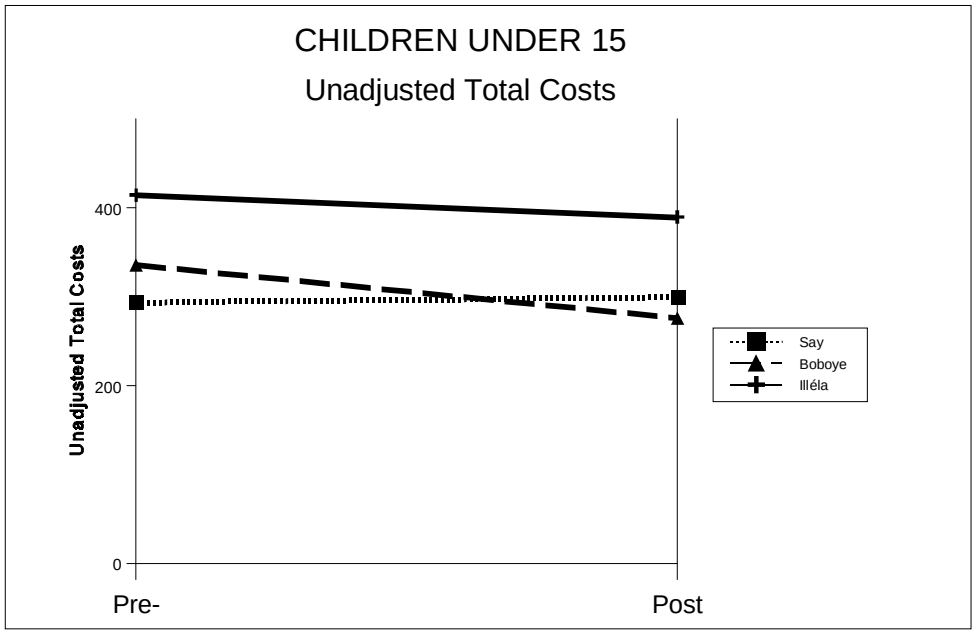

Figure 5a

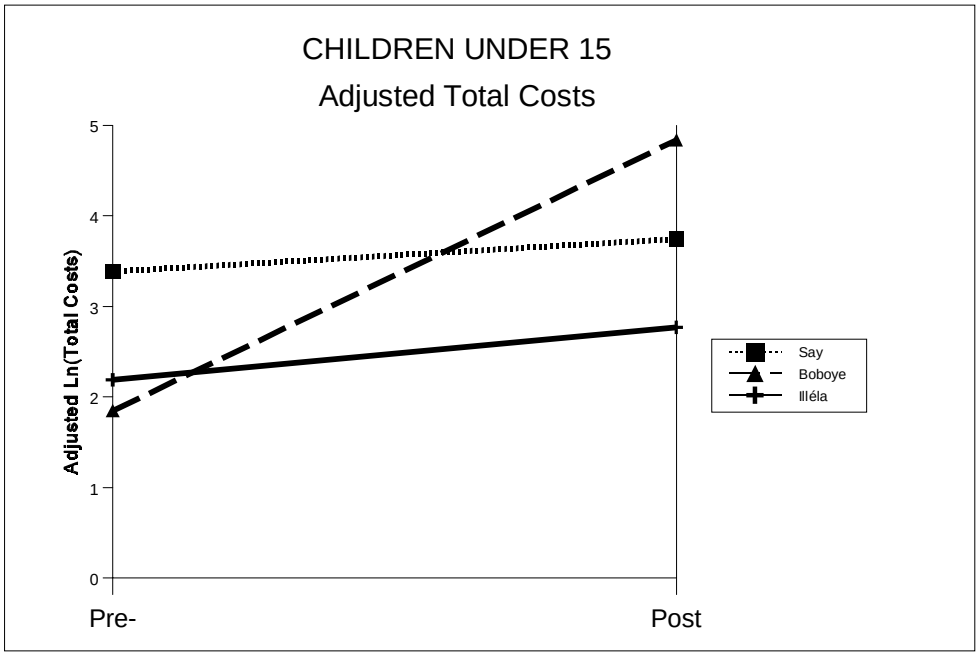

Figure 5b

EXHIBIT 10-1
EPISODE TOTAL AND CASH COSTS: COMPARISON OF MEAN
DIFFERENCES (ŋ) BETWEEN CONTROL AND INTERVENTION SITES

Population Group		SAY - ŋ			BOBOYE - ŋ			ILLÉLA - ŋ			H_0 Say & Illéla	H_0 Bob & Illéla
		no.obs.	mean	variance	no.obs.	mean	variance	no.obs.	mean	variance	t-test	t-test
General	Total	327	0.32*	7.01	515	1.81*	1.65	256	-0.13	8.13	1.95*	10.37*
	Cash	327	0.58*	7.15	515	2.04*	1.66	256	-0.4*	8.46	4.22*	12.87*
Malaria-like	Total	169	0.26	6.69	287	1.60*	1.76	133	-0.76*	7.15	3.34*	9.64*
	Cash	168	0.31	7.24	287	1.87*	1.76	133	-0.8*	7.44	3.37*	10.52*
Females	Total	184	-0.08	7.28	268	2.02*	1.68	128	-0.79*	8.53	2.18*	10.41*
	Cash	183	-0.19	7.17	268	1.92*	1.65	128	-1.3*	9.16	9.95*	42.89*
Poor 45%	Total	142	0.26	5.98	215	2.12*	0.73	112	-0.58*	6.74	2.63*	10.71*
	Cash	142	0.27	6.20	215	2.32*	0.69	112	-0.57*	7.08	2.57*	11.22*
Child ≤ 15	Total	178	0.37*	5.77	255	2.99*	1.35	119	0.58*	8.02	0.67	8.94*
	Cash	178	0.63*	6.14	255	1.98*	1.47	119	-0.3	8.28	2.91*	8.35*

$ŋ_k$ = ln [$EPCOST_k$(actual)+1] – ln [$EPCOST_k$(predicted)+1]

if $ŋ_k$>0, then post-intervention costs>pre-intervention costs

if $ŋ_k$<0, then post-intervention costs<pre-intervention costs

H_0: ($ŋ_{\text{intervention district}} - ŋ_{\text{Illéla}}$)=0 Comparison of the means, t-test

if $ŋ_{\text{intervention district}} - ŋ_{\text{Illéla}}$)>0, episode costs in the intervention site increased relative to the control site

if $ŋ_{\text{intervention district}} - ŋ_{\text{Illéla}}$)<0, episode costs in the intervention site decreased relative to the control site

* significant at 5% level

Interdistrict comparisons—patterns in Say and Boboye:

The unadjusted and adjusted results showed mixed results when comparing Say and Boboye in the changes they experienced relative to the trends in episode costs in Illéla. Using unadjusted episode cost averages shown in ***Exhibits 10-2a—10-2e***, Boboye experienced a greater percentage decline than Say for the general population, for the poor, and for children under 15; an equivalent percentage decline for malaria-like cases; and a smaller percentage decline for females.[6] Detailed unadjusted episode cost information by component is given for each subpopulation in ***Exhibits A-2, A-3, and A-4***. In contrast, using adjusted episode costs given in ***Exhibits 10-3a—10-3e***, Boboye had relatively higher increases in episode costs than Say for all population groups. The results are in logarithmic form as a result of transformation and adjustment methods.[7]

Composition of Unadjusted Episode Costs:

For the population with general illnesses, the composition of unadjusted total costs in terms of cash, opportunity costs, home-based, facility-related, treatment, and transportation cost components is presented in ***Exhibit 10-4***. Selected items from ***Exhibit 10-4*** are represented graphically in ***Figures 6 through 14***.

In Say, the stability in unadjusted episode cash costs encompassed a fall in home cash costs offset by a small, but significant increase in facility cash costs. In contrast in Boboye, cash facility-related fees shifted to a mix of low user fees and tax payments. In Illéla, deterioration of the public health infrastructure was apparent in every cost component.

Figures 6, 7, and 8 show that cash costs accounted for about 90 percent or more of total episode costs in both the pre- and post-test periods. Opportunity costs were quite low both because the time required, on average, was an hour or less and because the value of time was low. This is shown in table A.5. The proportion of opportunity costs, however, did increase in the post-intervention period in the intervention districts, rising 3 to 6 percentage points; perhaps people were traveling more to get care (e.g. drugs). In Illéla, opportunity costs stayed at 4-5 percent.

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[6] In looking at the unadjusted averages, it is important to remember that underlying these averages are highly skewed distributions, with a majority of individuals incurring low expenses and a minority incurring high expenses. Also, although these averages are derived from random samples of the same sample clusters, they include different households. Pre- and post-test comparisons should be made with these caveats in mind.

[7] In looking at the adjusted averages, it is important to remember that the results are given as natural logs of episode costs. Percentage changes pertain to changes in the logs of episode costs, not actual costs. The logarithmic transformation weights the observations to render the distribution of episode costs more normal. The effect of outliers is reduced and more weight is given to changes occurring at low cost levels. Also, the differences of adjusted episode costs are based on predictions to account for the fact that the populations surveyed before and after the intervention, although random, were not the same.

EXHIBIT 10-2a
CHANGES IN UNADJUSTED (DESCRIPTIVE) EPISODE
TOTAL & CASH COSTS FROM BEFORE TO AFTER THE INTERVENTION
GENERAL ILLNESS

	SAY	BOBOYE	ILLÉLA
unadjusted EPCOST, pre-intervention	440.52	427.80	577.45
unadjusted EPCOST, post-intervention	444.96	342.70	381.75
changes in EPCOST	4.44	-85.10*	-195.70*
% change in episode TOTAL COSTS	**1%**	**-20%**	**-34%**
unadjusted EPCASH, pre-intervention	419.58	408.95	555.45
unadjusted EPCASH, post-intervention	396.04	317.85	361.16
change in EPCASH	-23.54*	-91.10*	-194.29*
% change in episode CASH COSTS	**-6%**	**-22%**	**-35%**

EXHIBIT 10-2b
MALARIA-LIKE

	SAY	BOBOYE	ILLÉLA
unadjusted EPCOST, pre-intervention	507.36	474.38	637.83
unadjusted EPCOST, post-intervention	344.96	321.75	310.39
change in EPCOST	-162.41	-152.63*	327.44*
% change episode TOTAL COSTS	**-32%**	**-32%**	**-51%**
unadjusted EPCASH, pre-intervention	484.59	457.73	616.66
unadjusted EPCASH, post-intervention	306.93	300.73	302.96
unadjusted EPCASH	-177.66	-157.00*	313.70*
% change in episode CASH COSTS	**-37%**	**34%**	**-51%**

EXHIBIT 10-2c
FEMALES

	SAY	BOBOYE	ILLÉLA
unadjusted EPCOST, pre-intervention	544.97	392.22	610.31
unadjusted EPCOST, post-intervention	280.53	274.19	291.53
change in EPCOST	-264.44	-118.03*	-318.78*
% change in episode TOTAL COSTS	**-49%**	**-30%**	**-52%**
unadjusted EPCASH, pre-intervention	519.01	374.51	591.35
unadjusted EPCASH, post-intervention	244.65	251.03	274.85
change in EPCASH	-274.36	-123.48*	-316.50*
% change in episode CASH COSTS	**-53%**	**-33%**	**-54%**

EXHIBIT 10-2d
POOREST 45%

	SAY	BOBOYE	ILLÉLA
unadjusted EPCOST, pre-intervention	165.92	171.60	200.30
unadjusted EPCOST, post-intervention	164.29	129.30	125.09
changes in EPCOST	-1.63	-42.30*	-75.21*
% change in episode TOTAL COSTS	**-1%**	**-25%**	**-38%**
unadjusted EPCASH, pre-intervention	163.55	166.41	197.33
unadjusted EPCASH, post-intervention	159.66	126.19	124.27
change in EPCASH	-3.89	-40.22*	-73.06*
% change in episode CASH COSTS	**-2%**	**-24%**	**-37%**

EXHIBIT 10-2e
CHILDREN UNDER 15 YEARS

	SAY	BOBOYE	ILLÉLA
unadjusted EPCOST, pre-intervention	293.68	335.79	414.40
unadjusted EPCOST, post-intervention	299.93	276.10	389.51
changes in EPCOST	6.25	-59.69*	-24.89
% change in episode TOTAL COSTS	**2%**	**-18%**	**-6%**
unadjusted EPCASH, pre-intervention	270.64	319.30	394.30
unadjusted EPCASH, post-intervention	270.51	242.48	370.08
change in EPCASH	-0.13	-76.82*	-24.22
% change in episode CASH COSTS	**0%**	**-24%**	**-6%**

* intra-district changes between pre- and post-test periods are significant at 5% level, non-parametric Wilcoxon test

EXHIBIT 10-3a
CHANGES IN THE LOGS OF ADJUSTED EPISODE
TOTAL & CASH COSTS: BEFORE TO AFTER THE INTERVENTION (Follow-up Survey Sample)
GENERAL ILLNESSES

	SAY	BOBOYE	ILLÉLA
ave. predicted ln(EPCOST), pre-intervention	3.47	3.12	2.94
ave. ln(actual EPCOST), post-intervention	3.85	4.92	2.83
changes in ln(EPCOST)	0.32	1.81	-0.13
% change in ln(episode TOTAL COSTS)	**+10%*^**	**+58%*^**	**-4%**
ave. predicted ln(EPCASH), pre-intervention	3.06	2.82	3.07
ave. ln(actual EPCASH), post-intervention	3.71	4.85	2.69
change in ln(adjusted EPCASH)	0.58	2.04	-0.41
% change in ln(episode CASH COSTS)	**+19%*^**	**+72%*^**	**-13%***

EXHIBIT 10-3b
MALARIA-LIKE

	SAY	BOBOYE	ILLÉLA
ave. predicted ln(EPCOST), pre-intervention	3.44	3.31	3.37
ave. ln(actual EPCOST), post-intervention	3.81	4.92	2.62
change in adjusted ln(EPCOST)	0.26	1.60	-0.76
% change in ln(episode TOTAL COSTS)	**8%^**	**+48%*^**	**-23%***
ave. predicted ln(EPCASH), pre-intervention	3.19	2.97	3.23
ave. ln(actual EPCASH), post-intervention	3.62	4.84	2.49
change in unadjusted ln(EPCASH)	0.31	1.87	-0.75
% change in ln(episode CASH COSTS)	**+10%^**	**+63%*^**	**-23%***

EXHIBIT 10-3c
FEMALES

	SAY	BOBOYE	ILLÉLA
ave. predicted ln(EPCOST), pre-intervention	3.40	2.80	3.42
ave. ln(actual EPCOST), post-intervention	3.52	4.81	2.72
change in adjusted ln(EPCOST)	0.08	2.02	-0.79
% change in ln(episode TOTAL COSTS)	**+2%^**	**+72%*^**	**-23%***
ave. predicted ln(EPCASH), pre-intervention	3.56	2.82	3.80
ave. ln(actual EPCASH), post-intervention	3.41	4.73	2.57
change in adjusted ln(EPCASH)	-0.19	1.92	-1.34
% change in ln(episode CASH COSTS)	**-5%^**	**+60%*^**	**-35%***

EXHIBIT 10-3d
POOREST 45%

	SAY	BOBOYE	ILLÉLA
ave. predicted ln(EPCOST), pre-intervention	2.97	2.43	2.68
ave. ln(actual EPCOST), post-intervention	3.27	4.55	2.13
changes in adjusted ln(EPCOST)	0.26	2.12	-0.58
% change in ln(episode TOTAL COSTS)	**+9%^**	**+87%*^**	**-22%***
ave. predicted ln(EPCASH), pre-intervention	2.88	2.21	2.55
ave. ln(actual EPCASH), post-intervention	3.20	4.52	2.01
change in adjusted ln(EPCASH)	0.27	2.32	-0.57
% change in ln(episode CASH COSTS)	**+9%^**	**+105%*^**	**-22%***

EXHIBIT 10-3e
CHILDREN UNDER 15 YEARS

	SAY	BOBOYE	ILLÉLA
ave. predicted ln(EPCOST), pre-intervention	3.39	1.85	2.19
ave. ln(EPCOST), post-intervention	3.75	4.84	2.77
changes in adjusted ln(EPCOST)	0.37	2.99	0.58
% change in ln(episode TOTAL COSTS)	**+11%***	**+162%*^**	**+26%***
ave. predicted ln(EPCASH), pre-intervention	2.93	2.77	3.03
ave. ln(actual EPCASH), post-intervention	3.56	4.75	2.58
change in adjusted ln(EPCASH)	0.63	1.98	-0.45
% change in ln(episode CASH COSTS)	**+22%*^**	**+71%*^**	**-15%**

* intra-district changes between pre- and post-test periods are significant at 5% level

^ inter-district pairwise comparisons between the intervention site and the control site (Illéla) are significant at 5% level

EXHIBIT 10-4
GENERAL ILLNESSES—UNADJUSTED EPISODE COSTS: PRE- AND POST-TEST NON-PARAMETRIC COMPARISONS & MEANS (IN FCFA)

Episode Costs	SAY					BOBOYE					ILLÉLA				
	Pre-test		Post-test		Wilcoxon	Pre-test		Post-test		Wilcoxon	Pre-test		Post-test		Wilcoxon
Total cost	440.52		444.96		1.71	427.80		342.70		8.95*	577.45		381.75		2.68*
Cash	419.58	(95%)	396.04	(89%)	2.02*	408.95	(96%)	317.85	(93%)	9.20*	555.45	(96%)	361.16	(95%)	2.21*
Oppor. Cost	21.24	(5%)	48.92	(11%)	0.87	18.88	(4%)	24.85	(7%)	1.41	22.13	(4%)	20.59	(5%)	3.45*
Total cost	440.52		444.96		above	427.80		342.70		above	577.45		381.75		above
Home	266.04	(60%)	242.47	(55%)	0.44	308.65	(73%)	224.61	(66%)	0.95	334.26	(58%)	149.16	(39%)	3.17*
Facility	174.48	(40%)	202.49	(46%)	1.40	119.15	(27%)	75.43	(22%)	0.14	243.19	(42%)	232.60	(61%)	3.25*
Tax						0		42.67	(12%)	n.a.					
Cash	419.58		396.04		above	408.95		317.85		above	555.45		361.16		above
Home	255.35	(61%)	231.32	(58%)	0.45	300.83	(75%)	213.89	(67%)	1.07	325.41	(59%)	137.00	(38%)	3.15*
Facility	164.23	(39%)	164.73	(42%)	3.47*	108.12	(25%)	61.30	(19%)	4.53*	230.05	(41%)	224.16	(62%)	0.81
Tax	0		0		n.a.	0		42.67	(13%)	n.a.	0		0		n.a.
Oppor. Cost	21.24		48.92		above	18.88		24.85		above	22.13		20.59		above
Home	10.84	(51%)	11.16	(22%)	0.69	7.83	(41%)	10.72	(43%)	4.48*	8.91	(40%)	12.16	(59%)	3.92*
Facility	10.40	(49%)	37.77	(77%)	1.50	11.05	(59%)	14.13	(%)	0.43	13.22	(60%)	8.44	(41%)	3.54*
Home Total	266.04		242.47		above	308.65		224.61		above	334.26		149.16		above
Cash	255.35	(96%)	231.32	(95%)	above	300.83	(97%)	213.89	(95%)	above	325.41	(97%)	137.00	(92%)	above
Oppor. Cost	10.84	(4%)	11.16	(5%)	above	7.83	(3%)	10.72	(5%)	above	8.91	(3%)	12.16	(8%)	above
Facility Total	174.48		202.49		above	119.15		75.43		above	243.19		232.60		above
Cash	164.23	(94%)	164.73	(81%)	above	108.12	(91%)	61.30	(81%)	above	230.05	(95%)	224.16	(96%)	above
Oppor. Cost	10.40	(6%)	37.77	(19%)	above	11.05	(9%)	14.13	(19%)	above	13.22	(5%)	8.44	(4%)	above
Home Cash	255.35		231.32		above	300.83		213.89		above	325.41		137.00		0.66
Consult.	58.33	(23%)	56.50	(24%)	0.79	23.06	(8%)	35.98	(17%)	0.96	84.33	(26%)	28.30	(21%)	2.95*
Drugs	197.02	(77%)	174.81	(75%)	0.23	277.78	(92%)	177.91	(83%)	0.88	241.08	(74%)	108.70	(79%)	4.03*
Facility Cash	164.23		164.73		above	108.12		61.30		above	230.05		224.16		above
Treatment	141.95	(86%)	118.05	(72%)	0.45	47.56	(44%)	37.23	(61%)	4.53	119.44	(52%)	129.60	(58%)	0.81
Transport.	18.07	(11%)	37.28	(23%)	1.14	30.89	(28%)	12.71	(21%)	2.52	61.25	(27%)	51.43	(23%)	0.42
Other	4.21	(3%)	9.40	(6%)	0.63	29.67	(27%)	11.36	(18%)	0.66	49.36	(21%)	43.13	(19%)	1.21
No.obs.	285		346			666		543			320		280		
No.obs.w/	90	(32%)	90	(26%)		239	(36%)	0		w/tax	109	(34%)	125	(45%)	
Tot cost=free								144	(26%)	excl.tax					

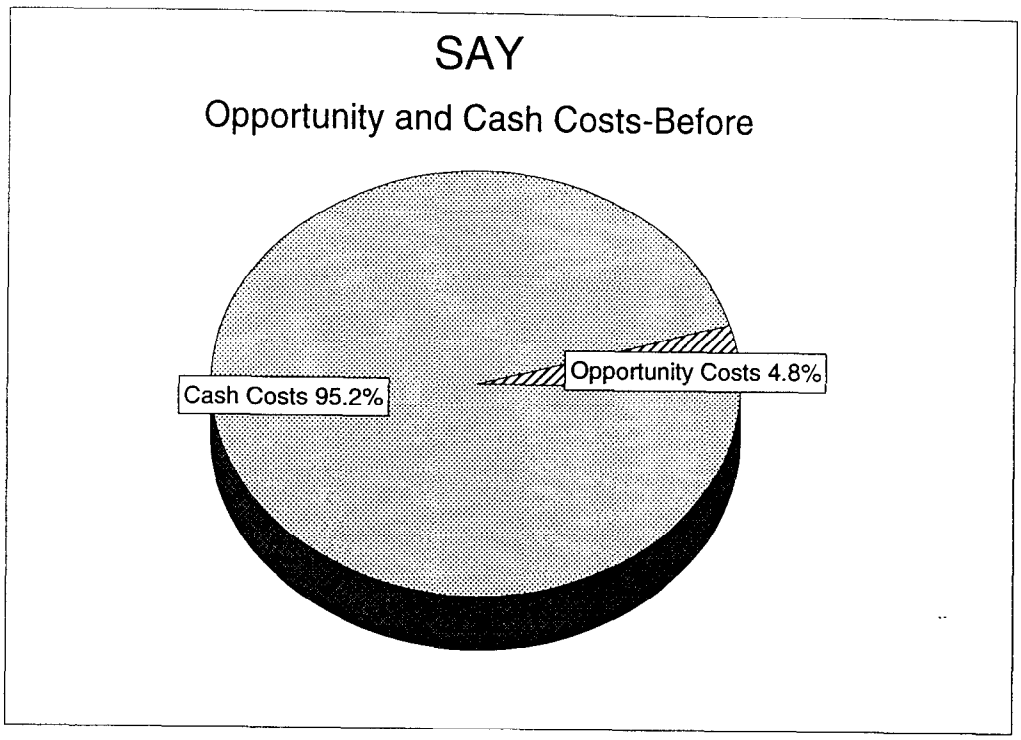

Figure 6a

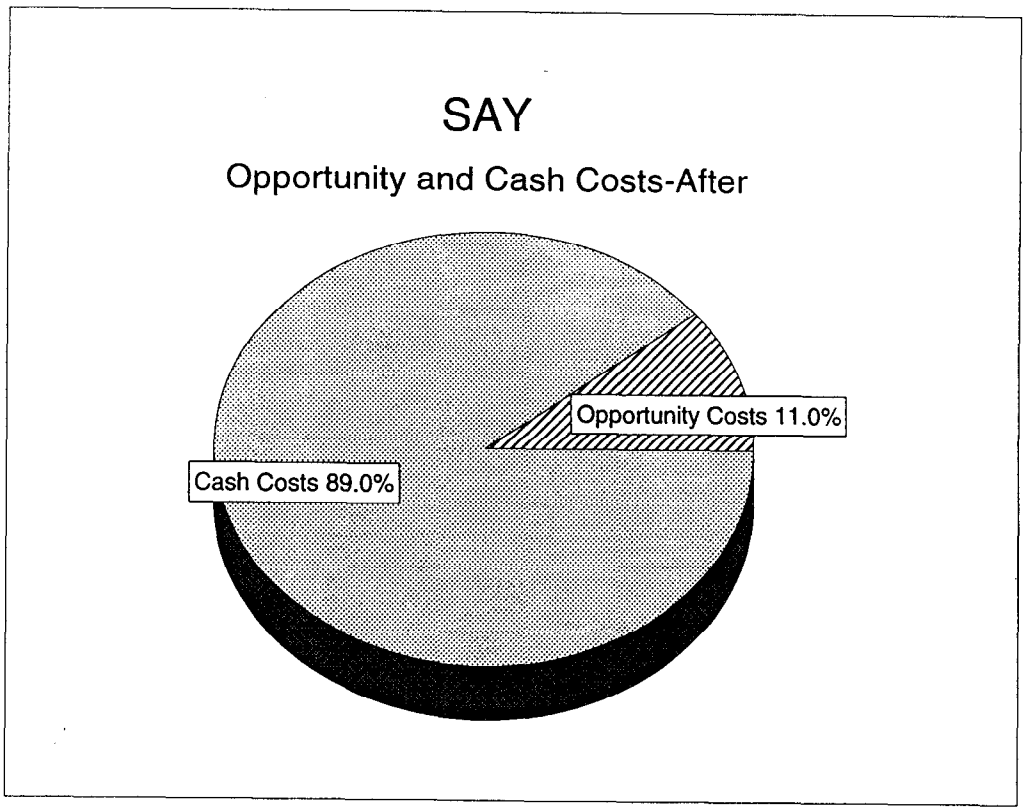

Figure 6b

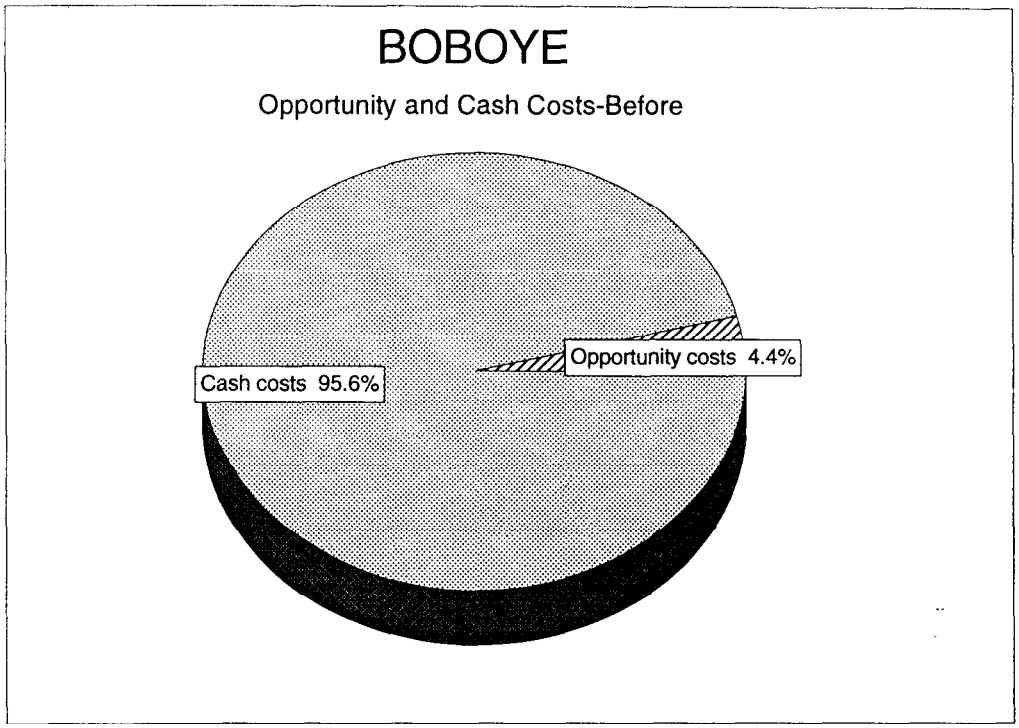

Figure 7a

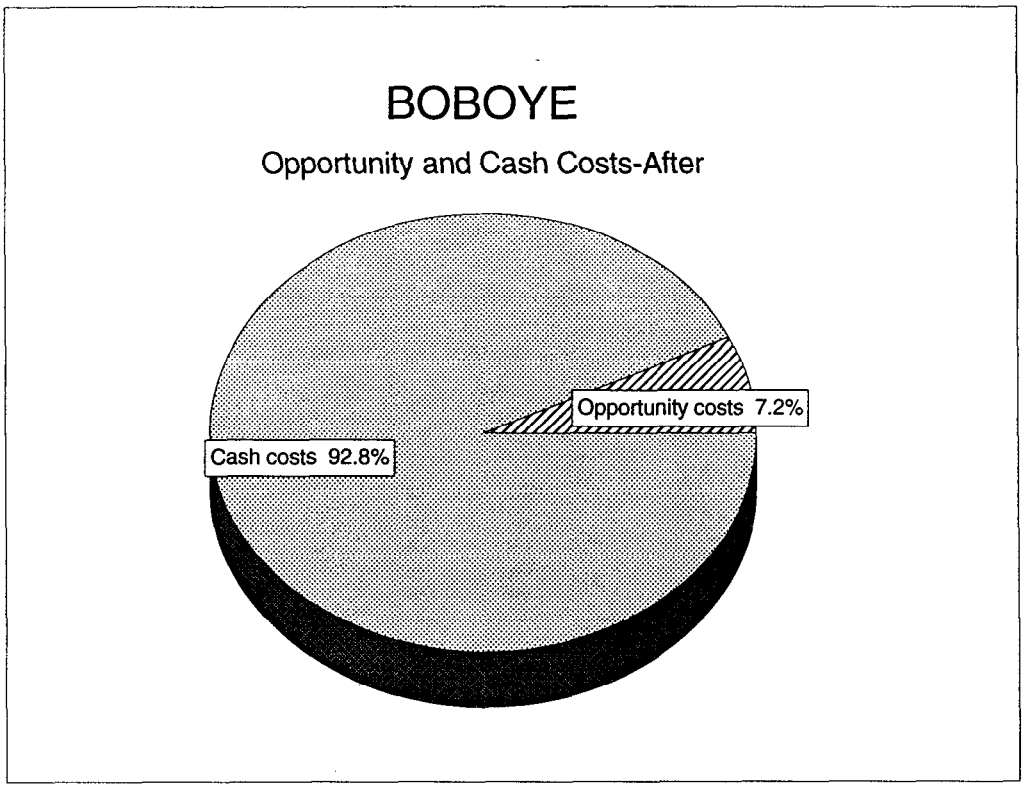

Figure 7b

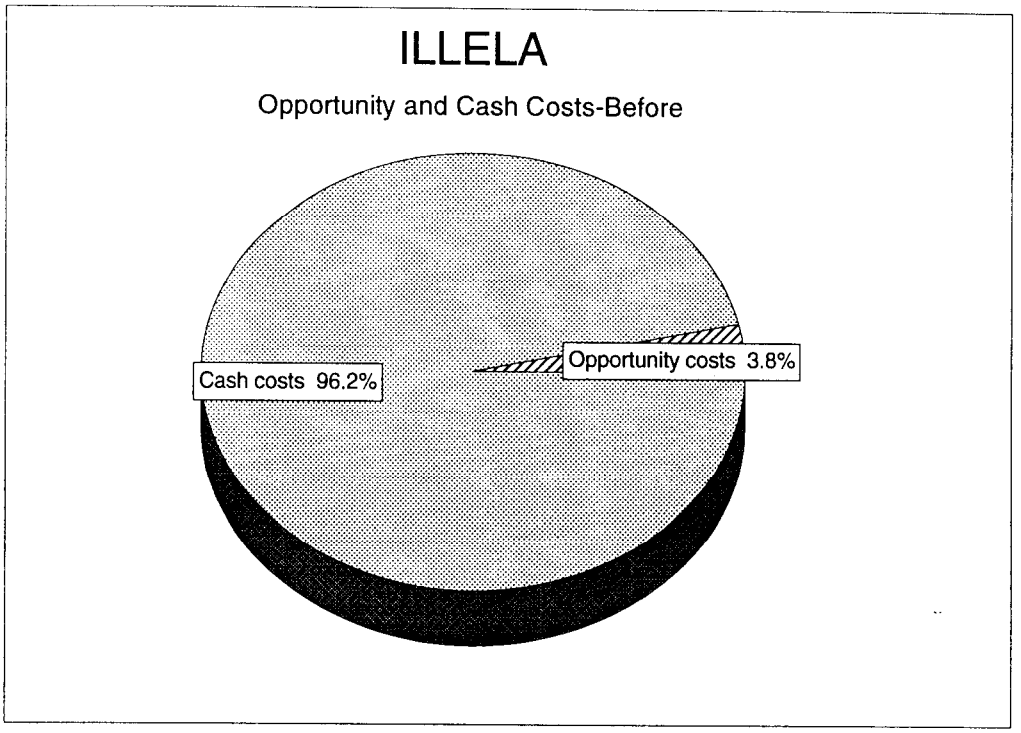

Figure 8a

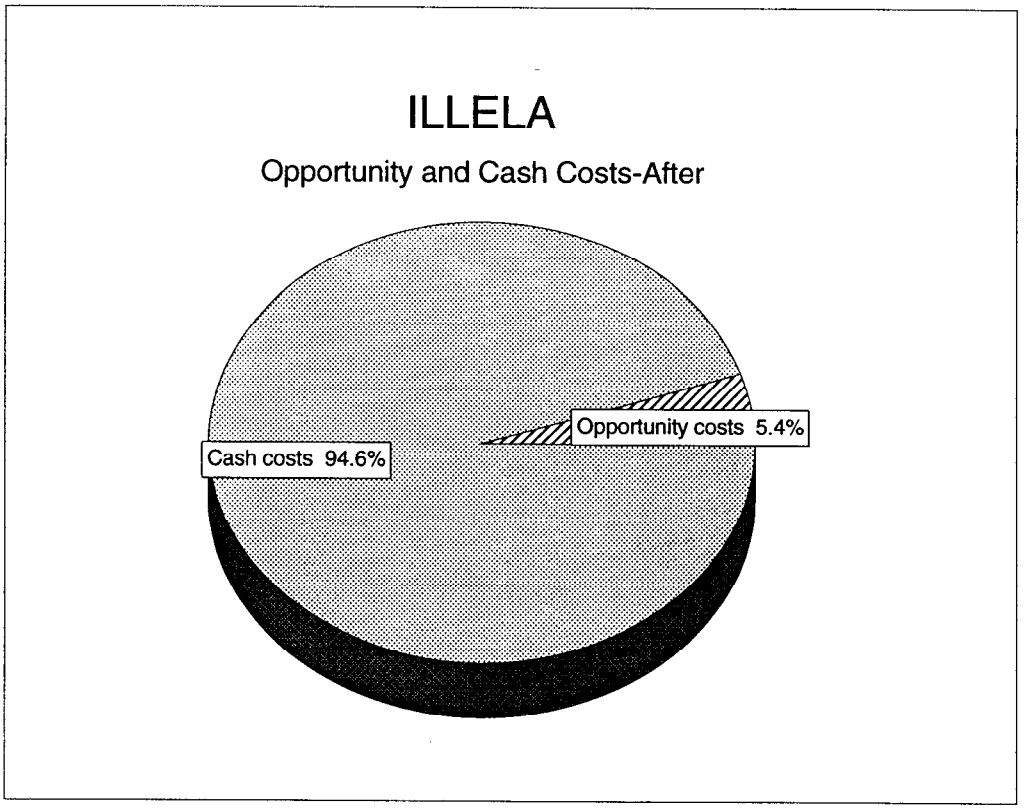

Figure 8b

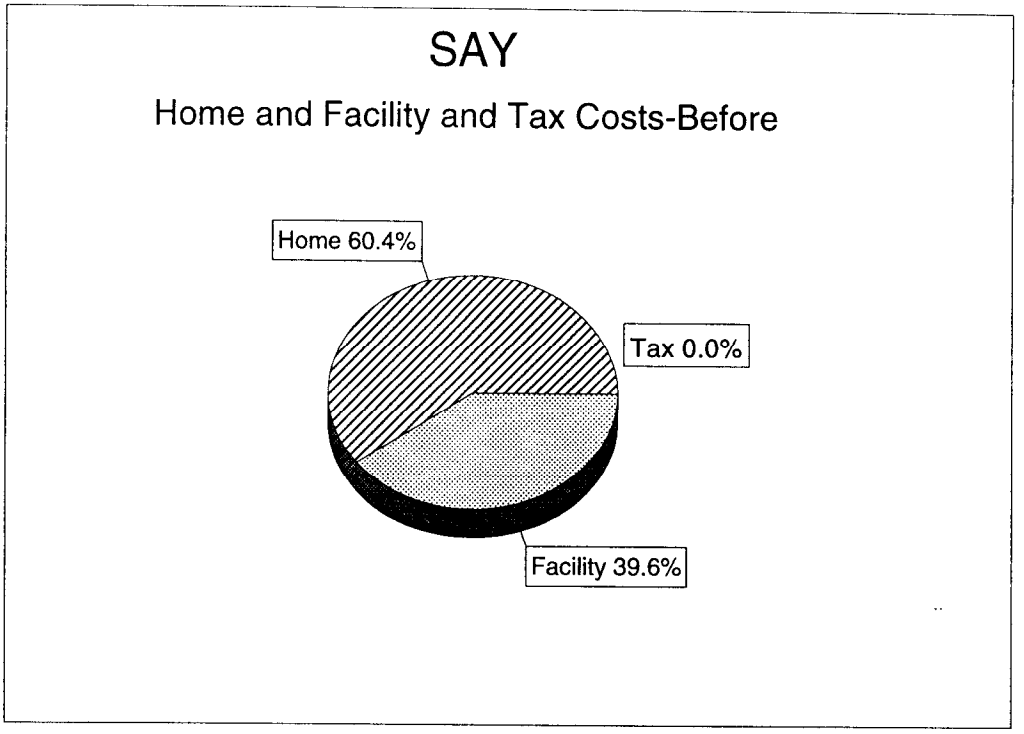

Figure 9a

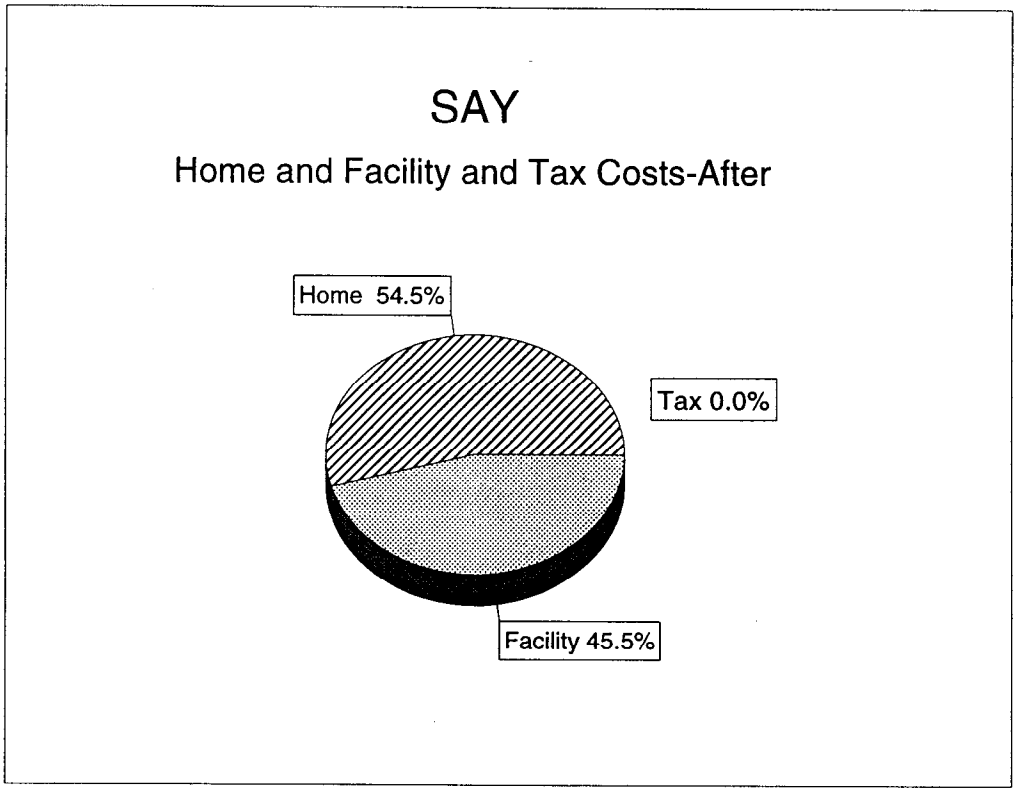

Figure 9b

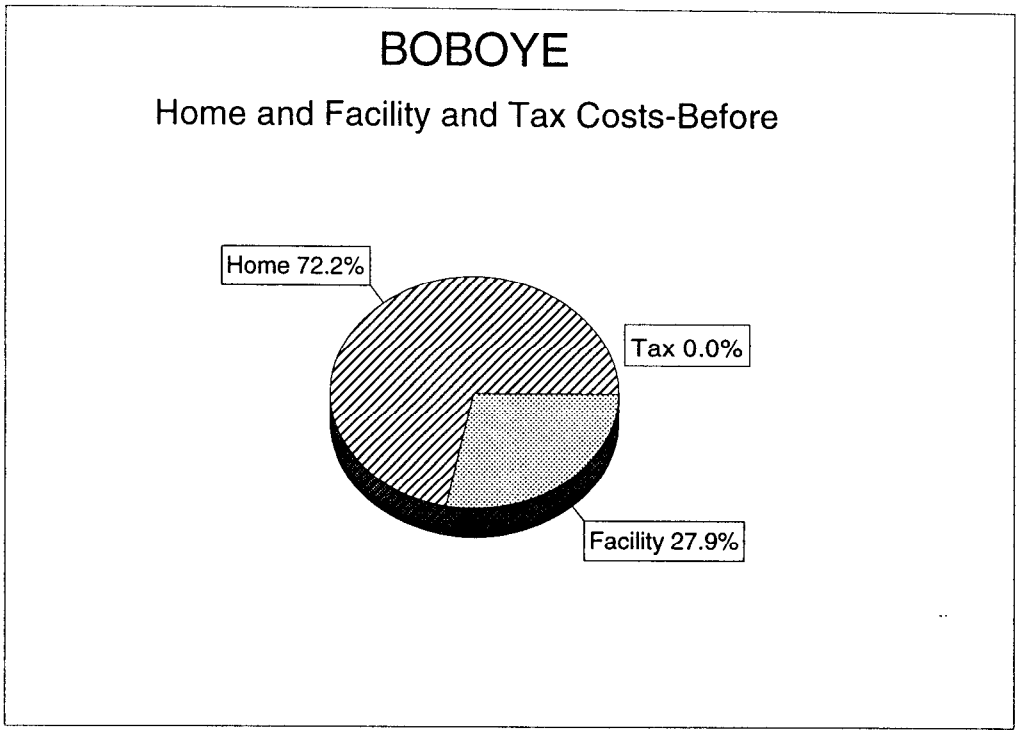

Figure 10a

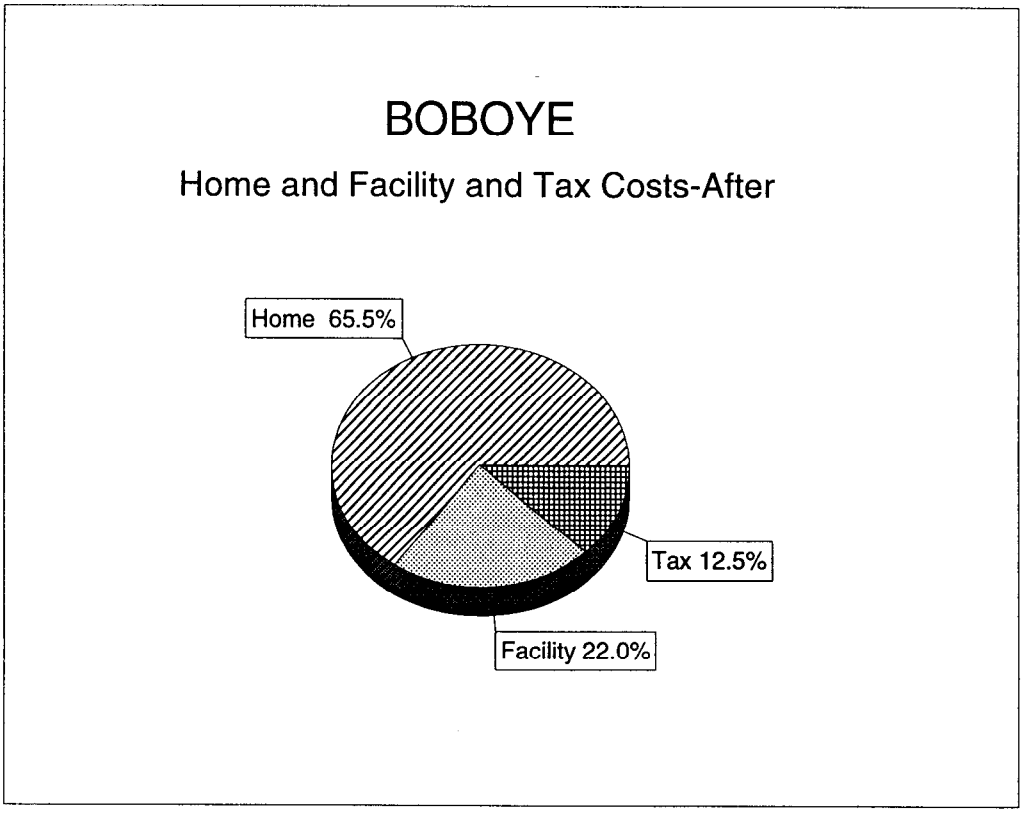

Figure 10b

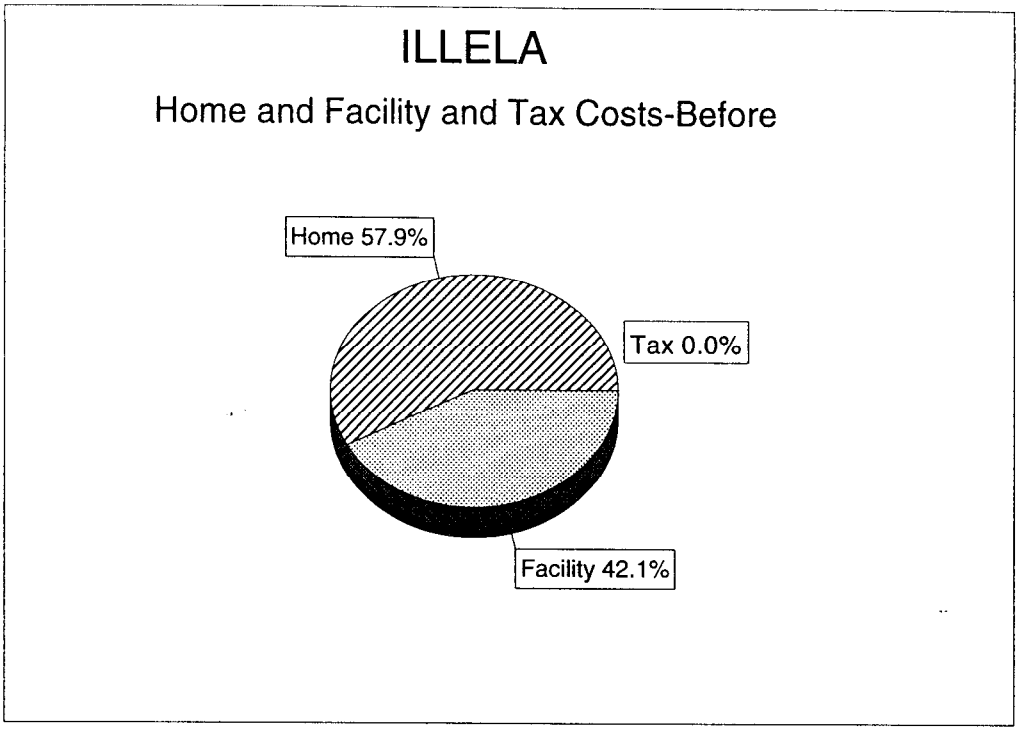

Figure 11a

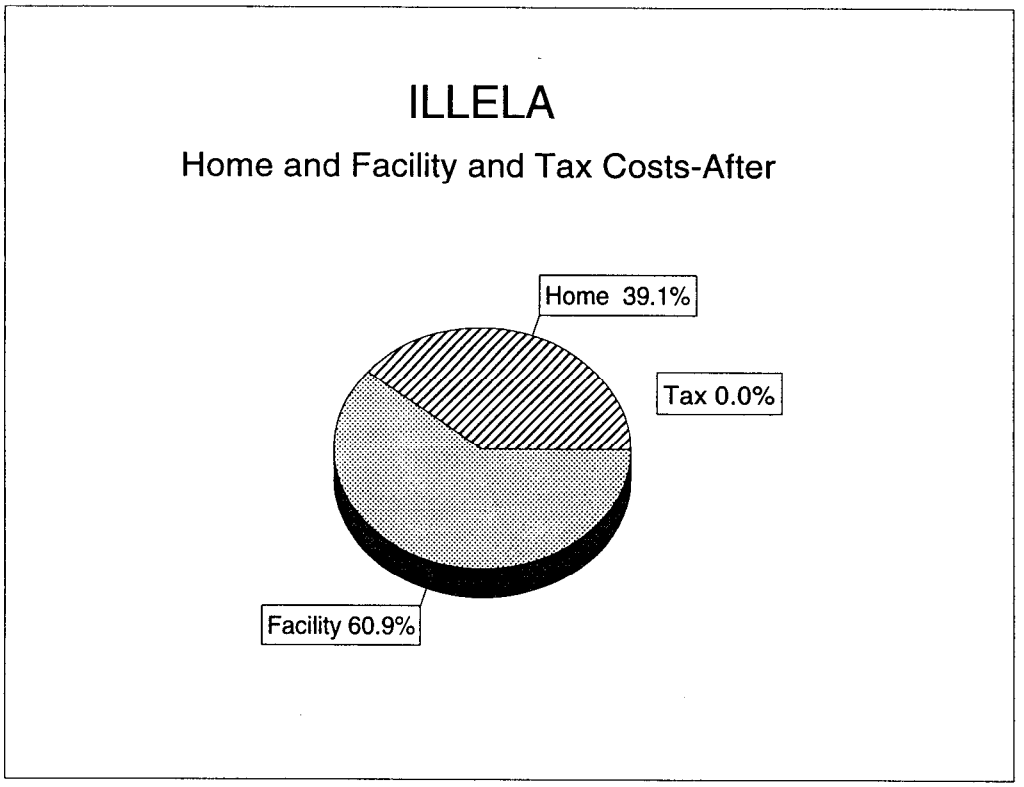

Figure 11b

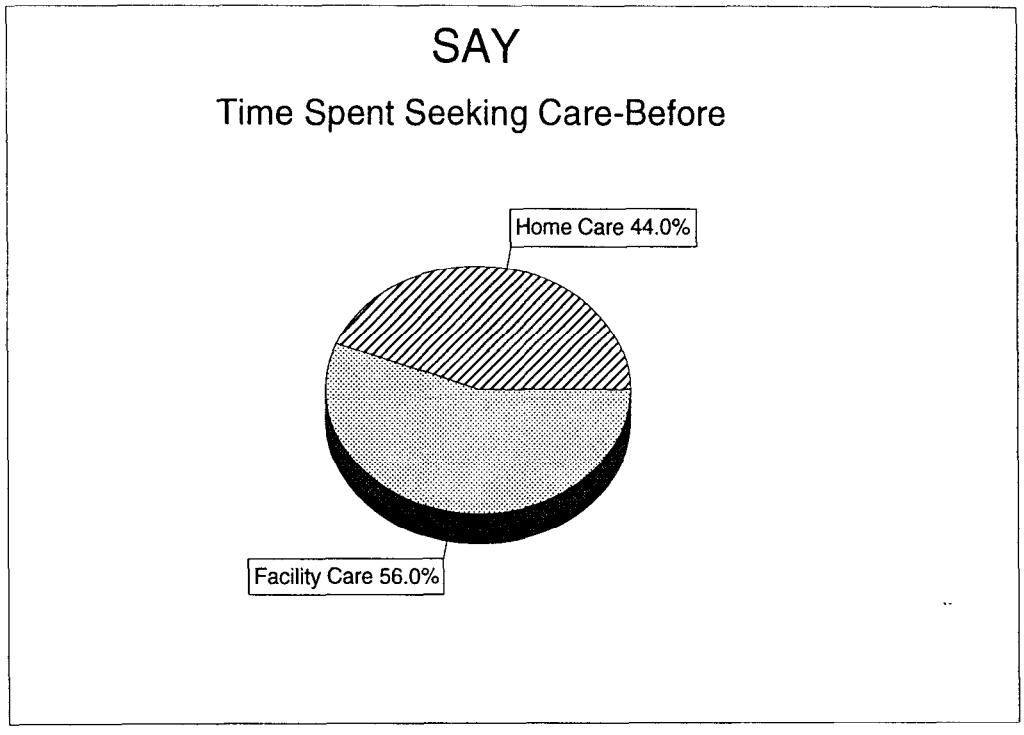

Figure 12a

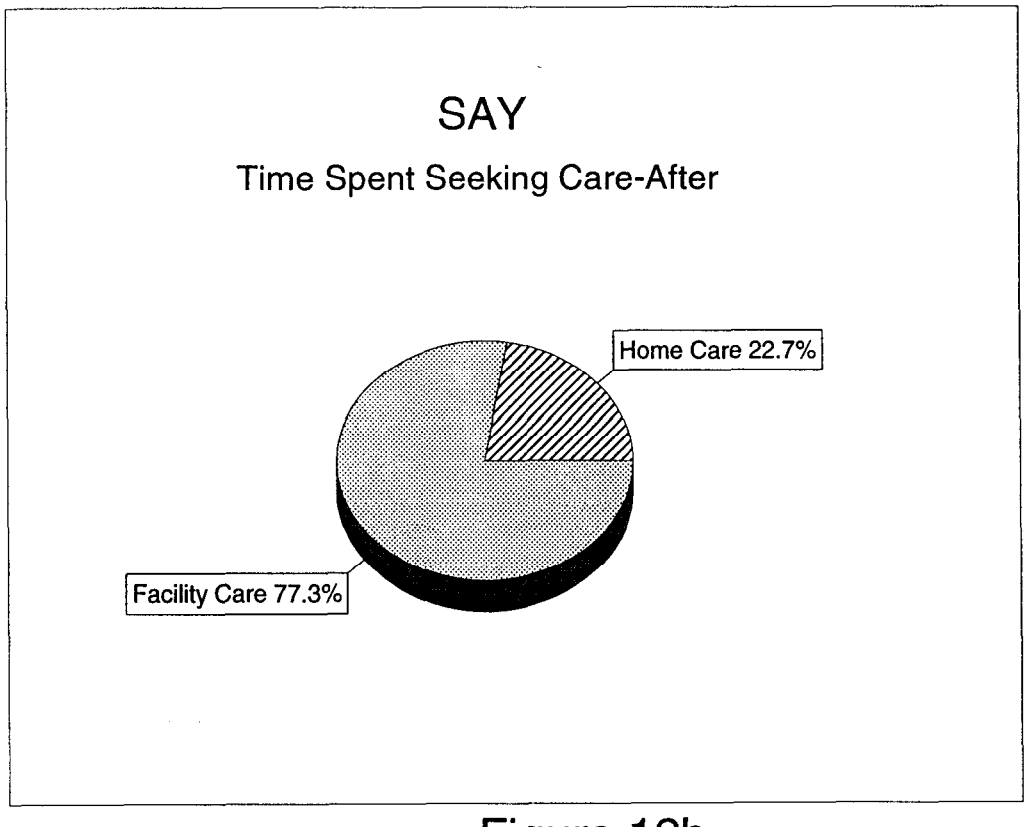

Figure 12b

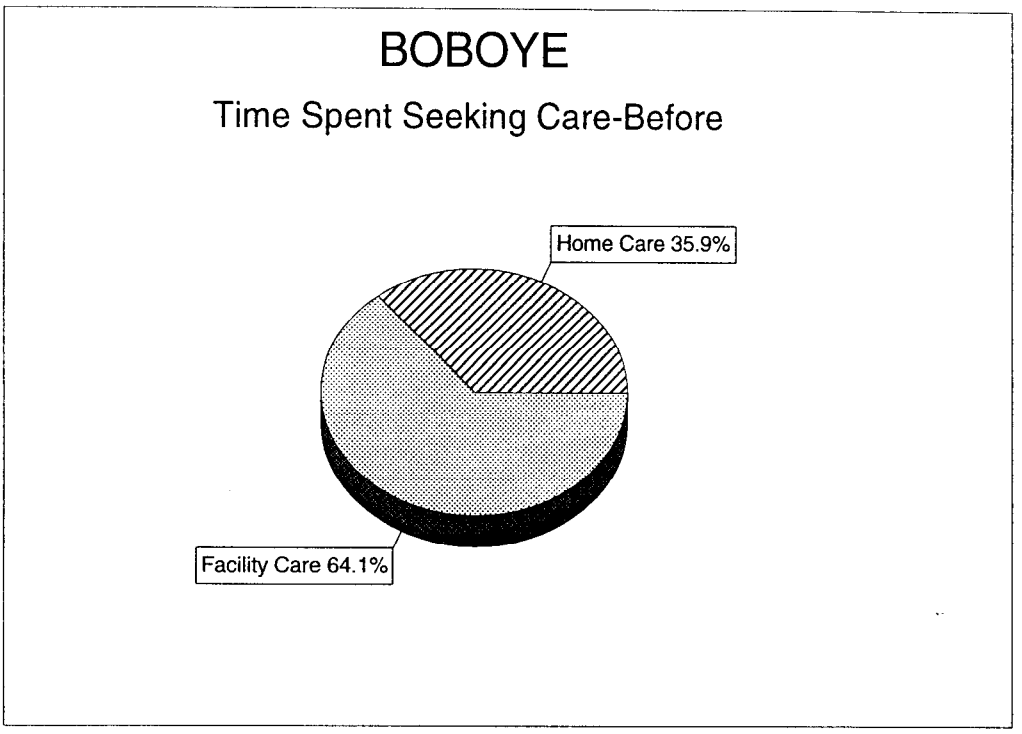

Figure 13a

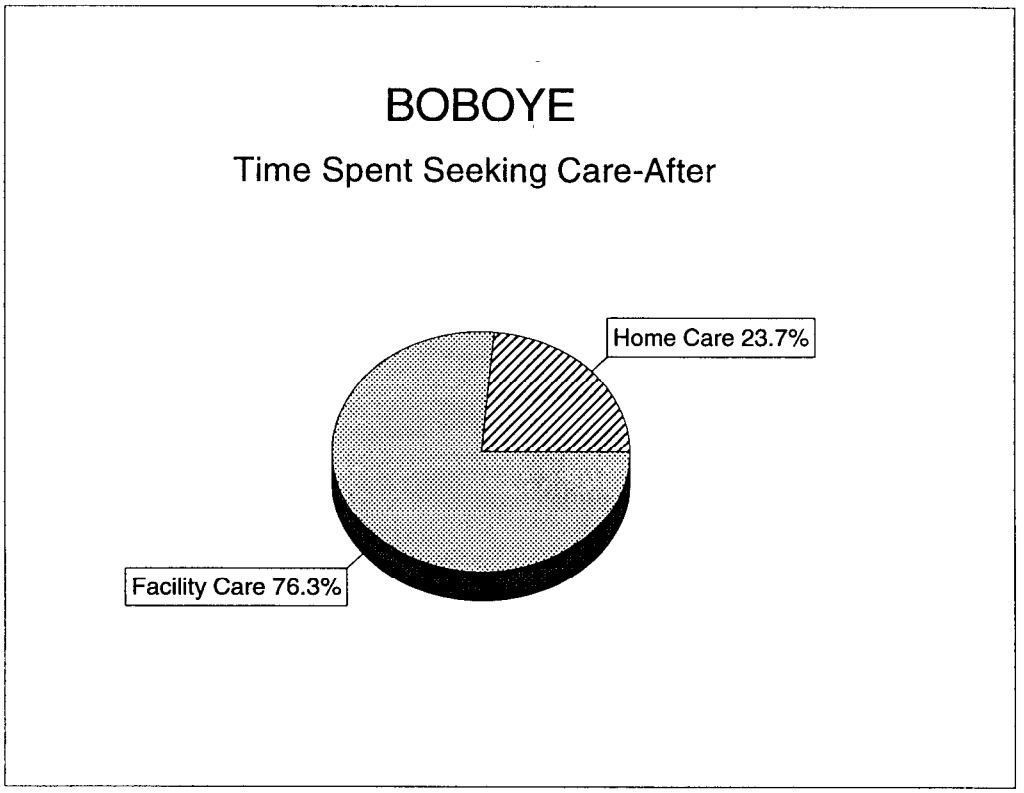

Figure 13b

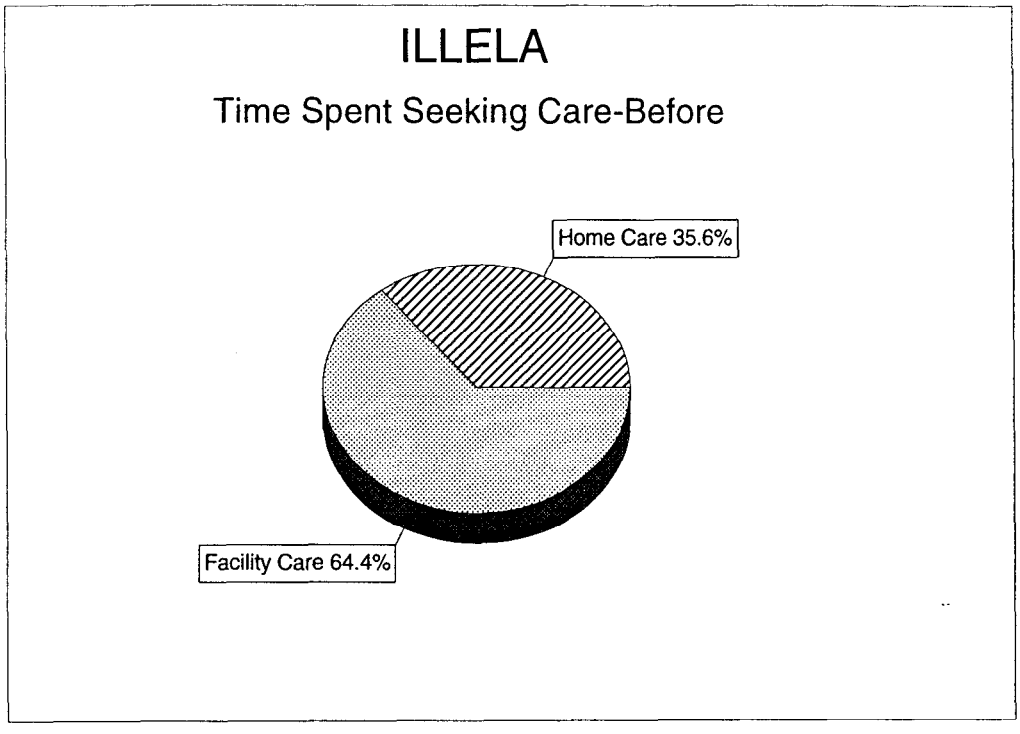

Figure 14a

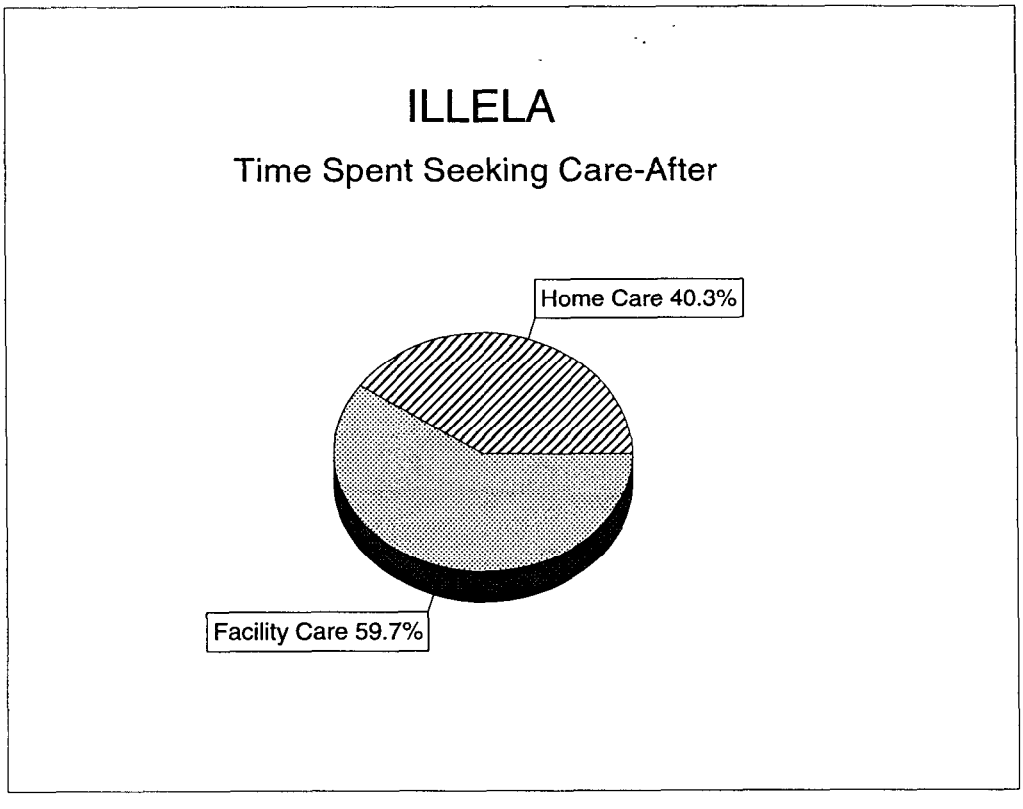

Figure 14b

According to ***Figures 9, 10, and 11***, home-related costs accounted for about 60 percent or more of episode costs in the pre-test period. After cost recovery, the proportion of home-related expenses decreased in all three districts, but remained a substantial portion (more than 50 percent). This pattern was evident looking at both total costs and cash costs. Even after the implementation of the intervention, patients still relied heavily on home-related treatment. A variety of factors might have explained this result. These patterns reflected short-run behavior; perhaps less home care would be used as the population became familiar with the intervention over time. Another explanation might have been that although drug stocks at government facilities were increased, they were still insufficient to meet population needs. Perhaps, essential drugs were leaking to the private sector such that patients could purchase them from a variety of private entrepreneurs. Or, maybe the types of essential drugs stocked were too limited. Further research is needed to explain this result.

Exhibit 10-4 indicates that patterns of home-related cash expenses were fairly constant with 75 percent-92 percent being spent for drugs. However, purchases from a public pharmacy declined in Boboye and Illéla. Since the pilot project improved drug supplies at public pharmacies, this pattern might be explained by lower drug prices instituted under the pilot project, or there might be some leakage of drugs to the market, such that individuals were purchasing essential drugs from private providers.

Cash expenditures for facility-related care were also spent mostly on treatment costs (drugs and consultation fees). About one-fifth of cash spent on facility visits was for transportation.

Trends for subpopulations:

The patterns of episode expenditures described above were similar across the various study populations with some exceptions. The data is given in ***Exhibits A.2, A.3, and A.4***. First, total episode costs, in absolute terms, for the poor were substantially less than for the general population in all three districts. Second, in Say and Illéla, the poorest seemed to use more home care than the general population. For example, in Say, the poor spent only 8 percent of total costs on facility-related care, in contrast to 40 percent for the general population. In Illéla, the poorest group spent 30 percent on facility care compared to 42 percent for the general population.

Opportunity and Time Costs:

Understanding the true opportunity costs associated with obtaining health care was difficult because of the lack of a clear measure of the value of time. As already mentioned, for this study, the value of time was proxied by the average hourly expenditures per adult. As ***Exhibit A.5*** shows, individuals did not earn very much (about 10 cents an hour, with a copayment of 50 FCFA per adult, most would have to work two hours to earn the fee); consequently, estimates of opportunity costs were low.

Setting aside the issue of the value of time, results on time spent seeking care yielded some interesting results. For Say and Boboye, there were no statistically significant changes in time spent seeking care, as shown in ***Exhibit A.5***. ***Figures 12 and 13*** show that in Say and Boboye a greater proportion of time was spent seeking care at facilities after the intervention. In Illéla, time spent seeking care fell in absolute terms. The proportions between time spent seeking home versus facility-related care stayed roughly the same as shown in ***Figure 14***.

These trends in total time spent seeking care were reflected in the variable EPOC. Episode opportunity costs showed no significant changes in Say and Boboye, but declined significantly in Illéla.

11.0 CONCLUSIONS AND DISCUSSION

Cost recovery interventions should be evaluated from a multitude of perspectives including efficiency, equity, revenue generation, quality of care, financial impact on patients, and utilization. Another consideration is who should choose how funds for health care services are used. Under social financing (with a tax), the government plays a stronger role in determining how resources for entitlements for health care should be allocated. Under fee-per-episode, patients allocate resources by 'voting with their feet'; that is, user charges decentralize much of the decision-making to the consumer. This study focused on one of these many criteria, namely, the financial impact on patients in terms of episode costs in a situation where quality of care improvements potentially might yield not only health but economic benefits. This study did not attempt to provide the full implications for welfare which are determined, in part, by comparing changes in episode costs with the changes in marginal benefits. The research question posed was: Did the total cost of an episode of treatment for an acute illness for a typical patient change when user fees were imposed but accompanied by an improved drug supply? This question was asked not only for the typical patient, but also for three subgroups of patients mentioned above. Equity was addressed by looking at changes in episode costs resulting from the cost-recovery intervention for specific target groups including women and girls, the poorest 45 percent of the population, and children under fifteen.

The cost recovery pilot project in Niger provided a unique opportunity to study this particular evaluation question using quasi-experimental design techniques. Extensive household and facility data were collected before and after the implementation of the intervention, in both the intervention districts and a control district.

With one exception, the comparisons of both the unadjusted and adjusted patient episode costs showed that patient episode costs in the intervention sites increased *relative* to the control site. The exception was for adjusted episode costs where the differences between the intervention and control sites were not significant between Say and Illéla for total episode costs for children. The two empirical approaches show mixed results when comparing Say and Boboye in the changes they experienced relative to the trends in episode costs in Illéla. Using unadjusted episode cost averages, Boboye experienced a greater percentage decline than Say for the general population, for the poor, and for children under 15; an equivalent percentage decline for malaria-like cases; and a smaller percentage decline for females. In contrast, using adjusted episode costs, Boboye had relatively higher increases in episode costs than Say for all population groups.

The results showed that cash costs accounted for about 90 percent or more of total episode costs in both the pre- and post-test periods. Opportunity costs were quite low both because the time required, on average, was an hour or less and because the value of time was low. The level of opportunity costs did not show any significant changes in Say and Boboye and declined in Illéla.

In Say, it appeared that patients in the study populations were incurring lower opportunity costs for home care and higher opportunity costs for facility care. Patients seemed to be spending more time traveling to facilities to benefit from the availability of drugs. Cash costs related to home care were also falling. Changes in facility cash costs were mixed, but increasing slightly overall. Substitution of facility care for home care was evident.

In Boboye, the level of opportunity costs increased for both home and facility-related care. Both home and facility cash costs fell, but were partially offset by tax payments. Facility cash costs plus the tax costs were roughly equivalent or somewhat more than facility cash costs incurred before the intervention (especially for females and the poor). Home cash costs fell the most, accounting for the overall drop in episode cash costs.

Home-related costs accounted for about 60 percent or more of episode costs in the pre-test period. After cost recovery, the proportion of home-related expenses decreased in all three districts, but remained a substantial portion (more than 50 percent). This pattern was evident looking at both total costs and cash costs. Even after the implementation of the intervention, patients still relied heavily on home-related treatment.

To summarize, the basic descriptive statistics provided useful information on both the level and composition of costs. For the comparisons of total patient episode costs between the control and intervention sites, the econometric analysis confirmed the general trends. The results suggest that the proposed explanation that cost recovery accompanied by an improved drug supply reduces the total cost of an episode of treatment by eliminating additional travel to pharmacies that sold higher priced drugs was only partly at work in Niger. Some substitution from home care and associated pharmacies to facilities was taking place. However, overall episode costs rose relative to the control site. The likely explanation is that before the intervention, the health care system had seriously deteriorated. This deterioration continued in Illéla, but in other two districts, the infusion of resources almost inevitably meant that patients would be spending more.

The comparisons between Say and Boboye provided more mixed results. The basic descriptive statistics showed that, in terms of trends of episode costs, neither type of payment system was unequivocally the better alternative. Changes in episode costs occurred differently for different population groups. The econometric results were similar for females, but not for the other population groups. In health care financing research, both in the U.S. and other countries, getting such mixed results is not unusual. It is well known that health care financing initiatives have varying effects across different population groups and should be closely monitored in each local context. Also, ocassionally, different statistical methods generate different results. The choice of which set of results to use is not always clear, especially when new statistical methods are being explored and tested as in this report. Over time, with continued monitoring and evaluation and periodic in-depth analysis, the long-term impacts of the innovative cost recovery system should become clearer.

12.0 LIMITATIONS OF THE STUDY

In interpreting these results, it is important to remember several limitations of the study. Although major efforts were made to adhere to quasi-experimental design methods, political and logistical realities impeded scientifically rigorous implementation. For example, study districts were chosen non-randomly. In Boboye, protocols were put in place three years before the implementation of cost recovery in contrast to Say where these same protocols were introduced at the time the cost recovery tests were instituted. Officials collected the head tax in Boboye about two years before the pilot project began and collected it only once in three years. Other difficulties were encountered in monitoring quality improvements; detailed empirical information on how well various treatment and management processes could not be collected. It was particularly challenging to examine episode costs using data from household surveys. One should have had fairly sophisticated medical records that included diagnostic codes, risk factors, and comorbidities in order to control for important confounding factors. Also, with household surveys, it was difficult to get complete episode information; this study included anyone who incurred any expense during the two-week recall period.

13.0 RECOMMENDATIONS

13.1 POLICY RECOMMENDATIONS

These results showing increases in costs relative to the control site heighten the need for policymakers to carefully consider whether the benefits associated with these different payment methods justify new costs to patients. Based on evidence from a related report *(Yazbeck et al., 1994)*, utilization of public health care services increased in Boboye and was stable in Illéla during the pilot tests, demonstrating patients' willingness to pay for the quality improvements. The implication of these findings is that to ensure the long-term sustainability of these results, policymakers should explore what other quality improvements, in addition to the availability of essential drugs, are medically important and preferred by patients. More effort should be placed on measuring and monitoring these quality improvements over time and among providers. Although patients were willing to pay higher episode costs for some quality improvements, the assumption was that the money being collected would contribute to the maintenance of these improved services. Policymakers should ensure that adequate financing and financial management systems are in place to sustain quality improvements; otherwise, willingness to pay these higher episode costs will disappear. Clearly, the cost implications of quality improvements must be well known.

13.2 FUTURE RESEARCH

The following recommendations on research focus on areas highlighted by this specific study.

1. Future research should attempt to identify other quality improvements which have public health merit and are perceived to be important by patients. Measurement of these quality attributes should be improved (structure, process, outcome) so that they can be monitored over time.

2. It would be valuable to collect complete episode-of-illness cost information. This study was limited by the fact that episode costs covered a two-week period of time, truncating costs either at the beginning and/or the end of the episode.

3. In order to be able to attribute cost changes to differences in payment methods, it is important to improve classification of patients by type of diagnosis and risk. Future research should explore improving the collection of such information with methods that are feasible yet valid and reliable.

4. Future research should pay more attention to the cost consequences of various payment methods. To date, the focus in developing countries has been on the effects of user fees on utilization patterns; this is important but incomplete.

5. The experimental design used for this pilot project provided extremely valuable information for monitoring and evaluating actual experiences with cost recovery and quality improvements. Future research should continue to explore using experimental design evaluation methods with health care financing initiatives; recognizing that such extensive data collection may not always be feasible. Feasible yet informative data collection methods should be developed and tried.

6. Research methods for comparing changes in episode costs over time in a quasi-experimental design setting should be further developed. The results of this study showed that descriptive and multivariate techniques can lead to somewhat different conclusions.

APPENDIX A
EMPIRICAL FRAMEWORK—THE TWO-PART MODEL USING ADJUSTED EPISODE COSTS

There were three issues to be resolved for the empirical analysis. The first dealt with how to model the individual's decision process for incurring health expenditures. The second dealt with the traditionally skewed distribution of health expenditures. The third pertained to identifying the appropriate set of factors with which to adjust total episode costs in order to make pre- and post-intervention comparisons between the intervention and control sites.

As already mentioned in the text, episode costs were transformed into natural logarithms to normalize the otherwise skewed distribution of health expenditures. The logarithmic transformation was maintained throughout the analysis.

A.1 EMPIRICAL FRAMEWORK—THE TWO-PART MODEL

In the previous literature there has been substantial discussion of the types of models which can be used to estimate health expenditures. The simplest empirical techniques used to predict expenses are analysis of variance (ANOVA) and analysis of covariance (ANOCOVA). Previous studies have shown that these methods yield highly imprecise results; they are not robust in the presence of outliers and inefficient when the strong assumptions about distributions are not met. *(Duan et al., 1983)*. The Litvack study in Cameroon used this approach; she did not find significant changes in health expenditures.

There are two basic regression approaches to estimating the determinants to total episode costs for ambulatory care: the two-part model and the sample selection model. The essence of the two-part model is to decompose one observed random variable of total episode costs (including zero and positive expenditures) into two observed random variables. First, there is a decision to incur positive expenses, and then a decision about the level of expenses, conditional on its being positive. In contrast, the one part model estimates the behavior of spenders and non-spenders in the same equation using a logarithmic transformation of episode costs.

In the two-part model, the first decision is examined using a probit equation for the dichotomous event—whether or not to seek treatment. Some threshold variable, I, determines when an individual (I) decides to incur expenses. We observe a dummy variable, D, which equals one if I is greater than zero, and equals zero for any other value of I. The estimate variable, δ_1, captures the strength and size of the relationship between each independent variable describing each individual and the threshold value. The error term, η_{1i}, is normally distributed with mean zero.

(1) $I_i = x_i\delta_1 + \eta_{1i}, \quad \eta_{1i} \sim N(0,1)$

where D = 1 if I > 0, and D = 0, otherwise.

The second part is a linear model of the logarithm of positive episode costs (EPCOST)

(2) $\ln(EPCOST_i \mid I_i > 0) = x_i\delta_2 + \eta_{2i}, \quad \eta_{2i} \sim N(0,\sigma^2)$

The question is whether the decision to seek treatment is tied to the expected costs of treatment. Empirically, the concern is whether there is correlation between the error terms of the two parts. Duan et al. (1983, 1984) contend that equations (1) and (2) can be estimated separately (e.g. in two separate parts). In contrast, the Tobit (1958) model and the self-selection or Heckman *(Heckman, 1979)* model assume that expenditure behavior is correlated with whether or not expenditures are incurred in the first place; that is, those who choose to incur expenditures are a selected population and will have expenditure patterns different than the general population. Least squares using only the sample with positive expenditures will provide biased estimates of the *unconditional* population, if the errors are correlated.

For this study, the use of the Tobit or Heckman approaches were problematic for several reasons. The Tobit model is a censored regression model; zero values of the dependent variable arise because of non-observability. It assumes that the censored and uncensored dependent variable can be explained by the same linear model and set of coefficients. In this case, zero values for health expenditures were *not* a result of non -observability. The Heckman model deals with selection bias by including in the cost equation an adjustment factor generated from the probit choice estimation. Several disadvantages to the Heckman approach have been expressed by Duan et al. (1983, 1984). First, the estimation requires the assumption that the error terms in equations (1) and (2) follow a bivariate normal distribution, a strong assumption. Second, the self-selection model has poor numeric and statistical properties, e.g., nonunique local maxima. Duan et al. also claim that the results are not significantly changed by including a selection bias correction factor. This is supported in several empirical studies *(Wouters, 1990; Weaver et al., 1993).* Welch et al. (1984) have found that estimates using the correction factor lack robustness. The assumptions regarding the zero expenditure data are untestable because they are unobservable.

This study estimated an ordinary least squares (OLS) linear model of positive expenditures separately from the choice equation. In the specification above, this meant estimating equation (2) using ordinary least squares. This has been used by Duan et al. (1983,1984). *Here the focus was on the conditional population, those who chose to seek treatment. How did the episode costs of this population change as a result of the intervention?* This focus eliminated the concern for selection bias since we were not attempting to make generalizations for the whole population, but only for those who sought treatment.

A.2 EXPERIMENTAL DESIGN: COMPARISON OF ADJUSTED EPISODE COSTS

A key objective of the analysis was to compare changes in episode costs between the intervention and control sites. Average total episode costs for individuals in each district had to be adjusted to control for the fact that the baseline and follow-up household surveys, although random, interviewed different individuals in each period. This section describes the empirical technique, the dependent variable, and the covariates.

ADJUSTED EPISODE COSTS: COMPARISON OF THE MEANS

Four steps were required to compare episode costs within and between the three districts. These steps were required to deal with the fact that the two surveys interviewed different samples from the same population and to provide statistical comparisons over time and across districts. The first step of the analysis answered the question: Before the cost recovery intervention was introduced, what total costs of an episode of treatment were expected for an individual with a certain illness condition and a specific set of socio-economic and demographic characteristics? As shown in equation (3), the baseline survey was used to generate estimated relationships between the natural logarithm of episode costs and the covariates reflecting an

individual's socio-demographic and economic characteristics, illness conditions (symptoms and severity), and proximity to a public health facility. Three sets of coefficients were estimated, one for each district. In the second step, these district-specific estimated relationships reflecting baseline behavior were then used to predict the natural logarithm of the costs of an episode of treatment for individuals in the follow-up survey. This is formulated in equation (4). These predictions answered the question: For those individuals who sought treatment after the intervention in each district, what total costs of an episode of treatment would they have incurred in the baseline period?

In the third step, for each individual, changes in episode costs between the two survey periods were determined by comparing actual episode costs incurred by an individual in the follow-up period with his/her predicted baseline episode costs, as shown in equation (5). Finally in the fourth step, individual-level differences between pre- and post-test episode costs estimated in step three were averaged for each district. Pairwise comparisons between each intervention site and the control site of the average differences in episode costs over time were made to determine whether patterns of episode costs under cost recovery differed from control conditions. The average of individual η_k for each intervention district, $\eta_{\text{intervention district}}$, was adjusted for trends not-specifically attributable to the intervention by statistically comparing it with the mean difference calculated for the control site, $\eta_{\text{Illéla}}$. If the comparisons between the means, Say and Illéla ($\eta_{\text{Say}} - \eta_{\text{Illéla}}$), and Boboye and Illéla ($\eta_{\text{lBoboye}} - \eta_{\text{Illéla}}$), were significantly different from zero, then one could reject the null hypotheses that the cost recovery pilot interventions had no effect on the total costs of an episode of illness. The null hypothesis is given in equation (6).

The empirical model is shown in equations (3) through (6). The variables include:

EPCOST	- total patient episode costs for treatment of an acute illness
ln	- natural logarithm transformation
X*j*	- covariates capturing socio-demographic characteristics, economic status, type of illness (symptoms, severity), $j = 1 \ldots s$
I	-patients in the pre-test household random sample, $I = 1 \ldots m$
k	-patients in the post-test household random sample, $k = 1 \ldots n$
η	-residual between predicted and actual expenditures for *k* individuals

(3) $$\ln (EPCOST_i + 1) = \alpha + \beta_j X_{ij} + \epsilon_i$$

(4) $$\ln [EPCOST_k (\text{predicted}) + 1] = \alpha^{est} + \beta^{est}_j X_{kj}$$

(5) $$\eta_k = \ln [EPCOST_k (\text{actual}) + 1] - \ln [EPCOST_k (\text{predicted}) + 1]$$

if $\eta_k > 0$, then post-intervention costs > pre-intervention costs
if $\eta_k < 0$, then post-intervention costs < pre-intervention costs

(6) H_0: $(\eta_{\text{intervention district}} - \eta_{\text{Illéla}}) = 0$ Comparison of the means, t-test

if $(\eta_{\text{intervention district}} - \eta_{\text{Illéla}}) > 0$, episode costs increased more in the intervention site than in the control site

if $(\eta_{\text{intervention district}} - \eta_{\text{Illéla}}) < 0$, episode costs increased less in the intervention site than in the control site

As explained above, logarithm transformations of episode costs were required for analysis. Retransforming the final results into actual expenditures could not be done without introducing bias. Neither the smearing nonparametric estimate nor the normal retransformation were appropriate given that outlier expenditures appeared to be non-randomly distributed within the population *(Duan, 1983; Duan et al., 1982).*

They tended to occur for higher-income families or for those in close proximity to a health facility. For this reason, logarithmic transformations of episode costs were maintained for the comparisons between survey periods and between intervention and control districts. Although this was less intuitively appealing, it minimized introducing biases into the comparisons.

The steps above were applied to the general population as well as to specific population groups: the poorest, children under fifteen, women and girls, and malaria cases. In each case the estimated coefficients used for prediction reflected the patterns of total episode costs for a specific site and for a particular population group.

COVARIATES—DEFINED

The covariates used for adjusting episode costs included: (a) per capita monthly expenditures; (b) illness group; (c) severity of illness; (d) gender; (e) age; (f) ethnic group; and (g) proximity to a public health facility.[8]

These covariates were chosen because they were expected to be significant determinants of episode costs and, if not controlled for, would have made it difficult to attribute changes in episode costs to the implementation of the cost-recovery intervention. Adjusting for these factors allowed one to compare pre- and post-test episode costs for individuals with an acute illness of a given severity, of a given age, gender, ethnic group, economic status, and proximity to a public health facility.

There are two major approaches to estimating economic status: full income and total household expenditures *(Gootaert, 1983).* The full-income approach relies on estimating the sum of monetary income, income in-kind (including the production of the household enterprise and government services), and the value imputed to services derived from endowments and assets such as durables, housing, and time owned by the household. The total household expenditure approach relies on estimating total household consumption. The key assumption is that the purchases of goods and services reflects the true preferences of the household. Consumption tends to fluctuate less than income, and as such is usually considered to be a better measure of permanent income (an average income expected over a lifetime, eliminating the major effects of seasonal variations or cycles of earning during various phases of one's working life). For this study, economic status was captured using per capita monthly household expenditures. Continuous as well as dummy variables differentiating various income groups were tested.

Ideally, one would have wanted to conduct this comparison of episode costs separately for different illness groups. Because of the sample size, this study was only able to focus on general acute illnesses and the subset, "malaria-like" illnesses.

Severity of illness was proxied by the number of days an individual is bedridden as a result of their illness. Three major categories were included: no bed days, one to five bed days, and six or more bed days.

Gender was included as an adjustment factor. This variable controlled for differences in health problems between males and females. Also, cultural factors might have been important. Women might not have had as much access to health care as men.

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[8] Education was not included because very few individuals reported attending a modern school (less than 20 percent). Marital status was dropped because of too many missing observations.

Age, as with gender, might have reflected both health and cultural factors. Age was tested as a continuous variable and as a dummy variable to distinguish three major age groups: 0-15 year, 15-40 years, and over 40 years. Sample sizes were too small to differentiate children under five years of age.

There were three major ethnic groups which accounted for the largest proportions of the populations: Hausa, Djerma, and Peulh. Adjustment variables indicating ethnic group controlled for differences in cultural beliefs about health and health care.

Public health facilities were located in selected communities in each district. The pharmacies associated with these facilities were an important source of drugs for patients. A dummy variable was used to indicate whether an individual lived in such a community.

The mean and standard deviations of these covariates are given in tables A.6, A.7, and A.8. The socio-demographic and economic characteristics of the populations who sought treatment in each of the three districts were quite similar. Household sizes averaged nine members in Say and Illéla and eleven in Boboye. About half of the study population was female. It was also young with 50 percent less than 15 years old and another one-third in the working age group (15 to 40 years old). Illéla was the poorest district recording average monthly expenditures at 1,993 FCFA. Average monthly expenditures for Boboye were 2,172 FCFA; for Say 2,143 FCFA. Approximately, 20 percent of individuals resided in a community with a public health facility.

About 56-59 percent of acute illnesses in Say and Illéla were probably malaria, in comparison to 47 percent in Boboye. Approximately, 35-46 percent of individuals with acute illness reported bed rest of one to five days. One-third to one-quarter stayed bedridden more than five days.

Hausa accounted for 89 percent of the Illéla study population. In contrast, the Djerma accounted for 83 percent of the Boboye population. Say was more mixed with 37 percent Peulh, 28 percent Djerma, and 35 percent various other ethnic groups.

These above population characteristics tended to hold across all of the various subpopulations with the exception of the proximity to a public health facility in the poorest group. In Say, only 7 percent of the poorest resided in a community with a public facility in contrast to 21 percent for the general population. In Boboye 12 percent of the poor were near a public health facility in contrast to 20 percent for the general population. Illéla showed the least inequity in distribution with 18 percent of the poorest near a public health facility, compared to 22 percent for the general population.

These descriptions of the socio-demographic and economic characteristics of the population tended to hold in the pre- and post-test periods.

REGRESSIONS FOR PREDICTIONS—EPISODE TOTAL COSTS

In general, the OLS regressions explained only a small portion of the total variation in episode costs. Detailed regression results can be found in the appendix, ***Exhibit A-9***. R-squared values ranged from 0.03 to 0.16. This result is typical of expenditure regressions *(Lubitz, 1985; Newhouse, 1989)*. These low R-squares clearly limit the reliability of adjusted post-test episode costs which are predictions based on these regressions. Regressions for the population of general illnesses and the subgroups varied widely in terms of which variables were significant. Few variables tended to be significant (at the 15 percent level or better) across all three districts and subgroups. Proximity to a health facility, household size, a dummy variable identifying poorest 45 percent, and number of days bedridden were the most consistently significant, but not in every case. Where significant, household size was positively related to episode costs. Being part of the poorest group reduced episode costs. More days in bed resulted in higher episode costs. These relationships were intuitively reasonable. Residing in a community with a public health facility tended to increase episode costs, patients were benefitting from easily accessible drug supplies. Other variables were sporadically significant. Ethnic group, gender, age and malaria cases were not significant determinants of episode costs. The results used to adjust episode cash costs generated quite similar results.

COMPARISON OF THE MEANS—EPISODE ADJUSTED CASH COSTS

Results of the comparison of the means of adjusted episode cash costs are given in two parts: first, whether the changes in the logarithm of adjusted episode cash costs within each district were significantly different from zero; second, whether differences in changes in the logarithm of adjusted episode costs were significantly different between the control and intervention sites. ***Exhibits 10-1 and 10-3*** summarize these results.

In the intervention districts, adjusted episode cash costs increased after the introduction of cost recovery. In Illéla, adjusted episode cash costs fell. In Say, the increases across time periods were significant for general illnesses and children but not for females, malaria-cases, or the poor. In Boboye, adjusted episode cash costs significantly increased for all groups.

Given the declining adjusted episode cash costs in Illéla and the increasing adjusted episode cash costs in Say and Boboye, it was not surprising to find significant differences between the intervention and control sites for all population groups:

General Population: In Say and Boboye, the inter-district comparisons between control and intervention sites were also significant.

Malaria-like illnesses: For malaria, adjusted episode cash costs increased significantly in Boboye but not in Say. They decreased in the control site. The changes in Say and Boboye were significantly different from the changes in episode costs in Illéla.

Females: In Say, this was the only population for which episode cash costs declined, but the decline was statistically insignificant. However, this decline was relatively less than the decline in Illéla. Episode costs for women in Boboye increased relative to baseline levels in Boboye and relative to Illéla.

Poorest 45 percent: In Say episode cash costs remained constant. In Boboye, episode cash costs increased while in Illéla, adjusted episode costs decreased from the pre-test to the post-test period. Interdistrict differences were significant.

Children under 15 years old: Episode cash costs increased significantly in Say and Boboye. In lléla, they remained constant. Episode costs in Say and Boboye increased significantly relative to those in Illéla.

Because these results were based on logarithmic transformations, it was difficult to identify the implications for absolute levels of actual expenses. Only relative changes can be assessed using percentage changes in logarithms. For general illnesses, logarithm of adjusted cash episode costs increased by about 19 percent in Say, 72 percent in Boboye and decreased by 13 percent in Illéla. Although copayments in Boboye were less than in Say, the episode tax contributed about 40 FCFA per episode. These patterns were similar for the other subgroups.

In Say, the largest percentage increase was for children under 15 (22 percent) followed by general illnesses (19 percent). In Boboye, the largest percentage increase was for the poorest (105 percent) compared with a 72 percent increase for the general population. In Illéla, episode cash costs fell by 13 percent to 35 percent.

To summarize, the empirical evidence indicated that for *those individuals who chose to seek treatment*, episode *cash* costs increased as a result of the cost recovery intervention. In Say, statistically significant increases occurred for general illnesses and children, but not for females, the poor, or malaria cases. The largest increases occurred in Boboye and were evident for all population subgroups. These results were not totally surprising given that the system moved from offering free care for a severely under-funded public health system to requiring various prepayments and/or co-payments for improved drug supplies. Comparison between intervention and control districts were always significant.

COMPARISON OF THE MEANS—TOTAL ADJUSTED EPISODE COSTS

As before, comparison of the means of the logarithm of adjusted episode total costs are given in two parts (intra- and inter-district). The results are summarized in ***Exhibits 10-1 and 10-3***.

In the intervention districts, episode total costs increased after the introduction of cost recovery. In Illéla, total episode costs decreased. In Say, as with cash costs, increases in total costs were statistically significant for both general illnesses and children only; the remaining populations showed no significant differences. In Boboye, consistently significant increases in adjusted episode cash costs were evident.

Inter-district comparisons between the control and intervention sites were always significant:

***General population*:** In Say and Boboye, episode costs increased; in Illéla, they fell. Increases in Boboye and Say were relatively higher than in Illéla.

Malaria-like illnesses: Adjusted episode total costs increased significantly in Boboye but not in Say. Interdistrict comparisons were significant.

Females: No significant changes occurred in Say. Boboye experienced significant increases. Comparison between intervention and control sites were significant.

Poorest 45 percent: In Say, episode total costs remained constant. In Boboye, episode costs increased. Interdistrict comparisons were significant.

Children under 15 years old: Episode total costs increased significantly in Say and Boboye and surprisingly also in Illéla. Differences between Say and Illéla were not significant. Differences between Boboye and Illéla were significant.

In terms of percent changes in logarithms, patterns observed with episode cash costs continued to hold with episode total costs. For general illnesses, episode costs increased by 10 percent in Say, by 58 percent in Boboye, and decreased by 4 percent in Illéla. These patterns are similar for the other population groups.

In Say, the largest percentage increase was for children (11 percent), followed by general illnesses (10 percent). In Boboye, the largest increase was for children (162 percent) followed by the poorest (87 percent). In Illéla, episode total costs fell by 4 percent to 26 percent, except for children where costs increased by 26 percent.

To summarize, the empirical evidence indicates that for *those individuals who chose to seek treatment*, episode *total* costs increased relative to the control site as a result of the cost recovery intervention. Within districts, as with cash costs, the largest increases occurred in Boboye and were apparent for all subpopulations. Episode costs in Say increased for general illnesses and children.

The major results for adjusted episode costs are summarized and discussed below:

- Relative to the control site, episode cash and total costs in the intervention districts increased as a result of cost-recovery. This was not surprising given the baseline situation where the public health system was in poor condition and drugs were scarce. Those who sought care in Say and Boboye under the cost-recovery system generally found health professionals trained in new diagnostic and treatment protocols and benefitted from improved stocks of essential drugs. In contrast, the situation in Illéla continued to deteriorate with episode costs falling during the study period. To the extent that the trends in Illéla reflected what would have happened in Say and Boboye without the intervention, the interdistrict comparisons were meaningful.
- Within each district, tests for statistically significant changes in adjusted episode costs before and after the intervention showed mixed results. In the conceptual framework, it was posited that total episode costs might fall or remain stable if the new sources of drugs at public health facilities were cheaper than previously sought alternatives and/or if the opportunity costs of obtaining care fell as patients eliminated additional travel to pharmacies or other providers of higher priced drugs and supplies. In Say, this hypothesis was rejected for the general population and children, but not for malaria cases, females, and the poor. In Boboye, this hypothesis is rejected for all groups.

    1. *In Say,* statistically significant increases in adjusted episode costs occurred for the general population and specifically for children, but not for malaria cases, females, or the poor. The insignificant or relatively small increases in adjusted episode costs in Say were consistent

with the hypothesis that patients might partially be absorbing the additional costs from user fees by substituting away from the higher costs of other providers.

2. *In Boboye*, adjusted episode costs increased substantially for all groups. In contrast to Say, the substitution patterns between home and facility care were not as evident.
3. *In Illéla*, episode costs fell for all components and for all groups. This reflected the deterioration of the health infrastructure, increasing stock outs and absence of medical supplies. Notably, 34 percent received free care in the baseline period in contrast to 45 percent in the follow-up. This might have reflected the fact that there simply was nothing to buy.

- Within each district, percentage changes in adjusted logarithms of episode costs showed that total adjusted episode costs increased the most in Boboye.

4. The typical patient *in Say* saw the adjusted logarithm of episode *total* costs increase by 10 percent.
5. *In Boboye*, the typical patient saw an increase in the adjusted logarithm of episode costs increase 58 percent.
6. *In Illéla*, the adjusted logarithm of episode costs fell around 4 percent.

- Within each district, changes in adjusted logarithm of episode costs expressed in percentages showed that some target groups were hit harder than others. Children experienced higher percentage increases, followed by the poor and then females. In Say these percentage increases were not substantially different from those experienced by the general population. In Boboye, all three groups experienced higher percentage increases than the general population.

7. *In Say*, among the target groups the largest percentage increase in the adjusted logarithm of episode total costs was for children under 15 (11 percent), followed by the poor (9 percent), followed by women (2 percent). This compared with a 10 percent increase for the general population.
8. *In Boboye*, the largest increase in the adjusted logarithm of episode total costs was for children (162 percent), followed by the poor (87 percent), followed by women (72 percent). This compared with a 58 percent increase for the general population.
9. *In Illéla*, episode costs fell by 4 percent to 26 percent.

- The results suggested that individuals might have misconceptions about the cost of health care services they incurred under a social financing mechanism. A majority of respondents stated as a reason for preferring the social financing payment method that it would cost less. The results in Boboye suggested otherwise. If all costs were accounted for including taxes, out-of-pocket cash payments and opportunity costs, episodes costs in Boboye dramatically increased, more than those in Say.

EXHIBIT A-1
COMPARABILITY OF PRE- AND POST-TESTS: BASIC DEMOGRAPHICS

	SAY		BOBOYE		ILLÉLA	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Full sample size	4,723	4,221	5,571	4,850	4,116	3,980
# reporting any illness	653 (14%)	853 (20%)	1,353 (24%)	945 (20%)	899 (22%)	928 (23%)
% female	48%	49%	56%	53%	53%	53%
% married	66%	64%	61%	69%	65%	70%
% child ≤ 5 years	23%	28%	23%	23%	27%	27%
% Djerma	25%	23%	77%	76%	0	0
% Hausa	8%	7%	5%	5%	82%	82%
% Peulh	44%	35%	15%	16%	3%	3%
% other ethnic	23%	35%	4%	3%	15%	15%
% reporting symptom:						
fever	76%	76%	86%	86%	91%	85%
cough	14%	15%	24%	16%	13%	12%
diarrhea	15%	16%	24%	23%	23%	21%

EXHIBIT A-2
SAY—UNADJUSTED EPISODE COSTS: MEANS (IN FCFA) AND VARIOUS COMPONENTS (%)

Episode	General Population		Malaria-like cases		Females		< 45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Total Cost	440.52	444.96	507.36	344.95	544.97	280.53	165.72	164.29	293.68	299.93
Cash	419.58 (95%)	396.04 (89%)	484.59 (96%)	306.93 (89%)	519.01 (95%)	244.65 (87%)	163.55 (99%)	159.66 (97%)	270.64 (92%)	270.51 (90%)
Oppor. Cost	21.24 (5%)	48.92 (11%)	22.92 (4%)	38.01 (11%)	26.37 (5%)	35.87 (13%)	2.17 (1%)	4.62 (3%)	23.04 (8%)	29.42 (10%)
Total Cost	440.52	444.96	507.36	344.95	544.97	280.53	165.72	164.29	293.68	299.93
Home	266.04 (60%)	242.47 (55%)	326.16 (64%)	168.77 (49%)	296.32 (54%)	178.42 (64%)	150.38 (91%)	110.15 (67%)	197.64 (67%)	166.37 (55%)
Facility	174.48 (40%)	202.49 (46%)	181.20 (36%)	176.18 (51%)	248.65 (46%)	102.10 (36%)	15.34 (8%)	54.14 (33%)	96.04 (33%)	133.56 (45%)
Cash	419.58	396.04	484.59	306.93	519.01	244.65	163.55	159.66	270.64	270.51
Home	255.35 (61%)	231.32 (58%)	315.13 (65%)	160.52 (52%)	283.02 (55%)	171.38 (70%)	149.09 (91%)	108.99 (68%)	184.80 (68%)	155.65 (58%)
Facility	164.23 (39%)	164.73 (42%)	169.47 (35%)	146.41 (48%)	235.99 (45%)	73.27 (30%)	14.46 (8%)	50.68 (32%)	85.84 (32%)	114.86 (42%)
Tax	0	0	0	0	0	0	0	0	0	0
Opport. Cost	21.24	48.92	22.92	38.01	26.37	35.87	2.17	4.62	23.04	29.42
Home	10.84 (51%)	11.16 (22%)	11.81 (52%)	8.24 (21%)	13.51 (51%)	7.04 (19%)	1.29 (59%)	1.16 (25%)	12.84 (56%)	10.72 (36%)
Facility	10.40 (49%)	37.77 (77%)	9.59 (48%)	29.77 (79%)	12.86 (49%)	28.83 (81%)	0.88 (41%)	3.46 (75%)	10.20 (44%)	18.71 (63%)
Home Total	266.04	242.47%	326.16	168.77	296.32	178.42	150.38	110.15	197.64	166.37
Cash	255.35 (96%)	231.32 (95%)	315.13 (97%)	160.52 (95%)	283.02 (96%)	171.38 (96%)	149.09 (99%)	108.99 (98%)	184.80 (94%)	155.65 (93%)
Oppor. Cost	10.84 (4%)	11.16 (5%)	11.10 (3%)	8.24 (5%)	13.51 (4%)	7.04 (4%)	1.29 (1%)	1.16 (2%)	12.84 (6%)	10.72 (7%)
Facility Total	174.48	202.49	181.20	176.18	248.65	102.10	15.34	54.14	96.04	133.56
Cash	164.23 (94%)	164.73 (81%)	169.47 (94%)	146.41 (83%)	235.99 (95%)	73.27 (72%)	14.46 (94%)	50.68 (93%)	85.84 (89%)	114.86 (86%)
Oppor. Cost	10.40 (6%)	37.77 (19%)	11.81 (6%)	29.77 (17%)	12.86 (5%)	28.83 (28%)	0.88 (6%)	3.46 (7%)	10.20 (11%)	18.71 (14%)
Home cash	255.35	231.32	315.13	160.52	283.02	171.38	149.09	108.99	184.80	155.65
Consult.	58.33 (23%)	56.50 (24%)	79.25 (25%)	24.03 (15%)	59.16 (21%)	39.89 (23%)	58.68 (39%)	13.85 (12%)	6.00 (3%)	20.22 (13%)
Drugs	197.02 (77%)	174.81 (75%)	235.88 (75%)	136.49 (85%)	223.85 (79%)	131.49 (77%)	90.41 (61%)	95.14 (87%)	178.80 (97%)	135.42 (87%)
Pharm.	*153.18 (78%)*	*124.22 (71%)*	*193.24 (82%)*	78.76 (58%)	*193.28 (86%)*	*87.29 (66%)*	*41.53 (46%)*	*53.38 (56%)*	*142.76 (80%)*	*96.80 (71%)*
Facility cash	164.23	164.73	169.47	146.41	235.99	73.27	14.46	50.68	85.84	114.86
Treatment	141.95 (86%)	118.05 (72%)	141.79 (84%)	101.66 (69%)	194.00 (82%)	43.22 (59%)	13.63 (94%)	44.60 (88%)	81.44 (95%)	95.48 (83%)
Transport.	18.07 (11%)	37.28 (23%)	22.33 (13%)	37.02 (25%)	38.55 (16%)	25.00 (34%)	0 (0%)	1.35 (3%)	2.00 (2%)	11.80 (10%)
Other	4.21 (3%)	9.40 (6%)	5.35 (3%)	7.73 (5%)	3.44 (2%)	5.05 (7%)	0.83 (6%)	4.73 (9%)	2.40 (3%)	7.58 (7%)
No. obs.	285	346	159	181	131	188	121	148	125	178
No. obs. w/ Tot cost=free	90 (32%)	90 (26%)	47 (30%)	43 (24%)	42 (32%)	59 (31%)	36 (30%)	44 (30%)	34 (27%)	43 (24%)

EXHIBIT A-3
BOBOYE—UNADJUSTED EPISODE COSTS: MEANS (IN FCFA) AND VARIOUS COMPONENTS (%)

Episode Costs	General Population		Malaria-like cases		Females		< 45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Total Cost	427.80	342.70	474.38	321.75	392.22	274.19	171.60	129.30	335.79	276.10
Cash	408.95 (96%)	317.85 (93%)	457.73 (96%)	300.73 (94%)	374.51 (95%)	251.03 (92%)	166.41 (97%)	126.19 (98%)	319.30 (95%)	242.48 (88%)
Oppor. Cost	18.88 (4%)	24.85 (7%)	16.64 (4%)	21.02 (6%)	17.71 (5%)	23.17 (8%)	5.19 (3%)	3.12 (2%)	16.54 (5%)	33.62 (12%)
Total Cost	427.80	342.70	474.38	321.75	392.22	274.19	171.60	129.30	335.79	276.10
Home	308.65 (73%)	224.61 (66%)	342.06 (72%)	186.25 (58%)	300.93 (77%)	148.68 (54%)	124.03 (72%)	56.46 (44%)	254.48 (76%)	191.17 (76%)
Facility	119.15 (27%)	75.43 (22%)	132.31 (28%)	93.28 (29%)	91.29 (23%)	83.85 (31%)	47.58 (28%)	30.89 (24%)	81.31 (24%)	45.61 (24%)
Tax	0	42.67 (12%)	0	42.22 (13%)	0	41.66 (15%)	0	41.95 (32%)		
Cash	408.95	317.85	457.73	300.73	374.51	251.03	166.41	126.19	319.30	242.48
Home	300.83 (75%)	213.89 (67%)	336.33 (73%)	176.41 (59%)	293.28 (78%)	139.86 (55%)	122.22 (73%)	56.36 (45%)	248.01 (78%)	174.94 (72%)
Facility	108.12 (25%)	61.30 (19%)	121.40 (27%)	82.10 (27%)	81.23 (22%)	69.51 (28%)	44.19 (27%)	27.88 (22%)	71.29 (22%)	28.22 (12%)
Tax	0	42.67 (13%)	0	42.22 (14%)	0	41.66 (17%)	0	41.95 (33%)	0	39.32 (16%)
Opport. Cost	18.88	24.85	16.64	21.02	17.71	23.17	5.19	3.45	16.54	33.62
Home	7.83 (41%)	10.71 (43%)	5.73 (34%)	9.84 (47%)	7.65 (43%)	8.82 (38%)	1.81 (35%)	0.37 (11%)	6.49 (39%)	16.23 (48%)
Facility	11.05 (59%)	14.13 (57%)	10.91 (66%)	11.18 (53%)	10.06 (57%)	14.34 (62%)	3.39 (65%)	3.08 (89%)	10.05 (61%)	17.39 (52%)
Home Total	308.65	224.61	342.06	186.25	300.93	148.68	124.03	67.04	254.48	191.17
Cash	300.83 (97%)	213.89 (95%)	336.33 (98%)	176.41 (95%)	293.28 (97%)	139.86 (94%)	122.22 (99%)	66.67 (99%)	248.01 (97%)	174.94 (92%)
Oppor. Cost	7.83 (3%)	10.72. (5%)	5.73 (2%)	9.84 (5%)	7.65 (3%)	8.82 (6%)	1.81 (1%)	0.37 (1%)	6.49 (3%)	16.23 (8%)
Facility Total	119.15	75.43	132.31	93.28	91.29	83.85	47.58	30.89	81.31	45.61
Cash	108.12 (91%)	61.30 (81%)	121.40 (92%)	82.10 (88%)	81.23 (89%)	69.51 (82%)	44.19 (93%)	27.88 (90%)	71.29 (88%)	28.22 (62%)
Oppor. Cost	11.05 (9%)	14.13 (19%)	10.91 (8%)	11.18 (12%)	10.06 (11%)	14.34 (18%)	3.39 (7%)	3.01 (10%)	10.05 (12%)	17.39 (38%)
Home cash	300.83	213.89	336.33	176.41	293.28	139.86	122.22	56.36	248.01	174.94
Consult.	23.06 (8%)	35.98 (17%)	22.93 (7%)	13.11 (7%)	25.98 (9%)	13.40 (10%)	3.47 (3%)	2.40 (4%)	8.73 (4%)	11.92 (7%)
Drugs	277.78 (92%)	177.91 (83%)	313.41 (93%)	163.30 (93%)	267.30 (91%)	126.46 (90%)	118.75 (97%)	53.95 (96%)	239.29 (96%)	163.02 (93%)
Pharm.	*198.54 (71%)*	*84.02 (47%)*	*253.57 (81%)*	*59.78 (34%)*	*192.32 (72%)*	*59.42 (47%)*	*76.60 (63%)*	*2.40 (4%)*	*178.32 (75%)*	*88.24 (54%)*
Facility cash	108.12	61.30	121.40	82.10	81.23	69.51	44.19	27.88	71.29	28.22
Treatment	47.56 (44%)	37.23 (61%)	67.75 (56%)	54.95 (67%)	19.87 (24%)	56.11 (81%)	17.45 (39%)	19.43 (70%)	15.28 (21%)	19.32 (68%)
Transport.	30.89 (28%)	12.71 (21%)	33.68 (27%)	13.75 (17%)	30.53 (38%)	1.40 (2%)	8.69 (20%)	4.52 (16%)	24.22 (34%)	3.53 (13%)
Other	29.67 (27%)	11.36 (18%)	19.97 (16%)	13.40 (16%)	30.83 (38%)	12.00 (17%)	18.05 (41%)	3.93 (14%)	31.79 (45%)	5.37 (19%)
No. obs.	666	543	311	291	366	285	259	230	322	255
No. obs. w/ Tot. cost =free	239 (36%)	0	108 (35%)	0	13 (37%)	0	110 (43%)	0	108 (34%)	0

EXHIBIT A-4
ILLÉLA—UNADJUSTED EPISODE COSTS: MEANS (IN FCFA) AND VARIOUS COMPONENTS (%)

Episode Costs	General Population		Malaria-like cases		Females		< 45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Total Cost	577.45	381.75	637.83	310.39	610.31	291.53	200.30	125.09	414.40	389.51
Cash	555.45 (96%)	361.16 (95%)	616.66 (97%)	302.96 (98%)	591.35 (97%)	274.85 (94%)	197.33 (99%)	124.27 (99%)	394.30 (95%)	370.08 (95%)
Oppor. Cost	22.13 (4%)	20.59 (5%)	21.29 (3%)	7.42 (2%)	19.21 (3%)	16.68 (6%)	2.97 (1%)	0.82 (1%)	20.11 (5%)	19.42 (5%)
Total Cost	577.45	381.75	637.83	310.39	610.31	291.53	200.30	125.09	414.40	389.51
Home	334.26 (58%)	149.16 (39%)	317.13 (50%)	125.22 (40%)	365.87 (60%)	145.72 (50%)	139.38 (70%)	70.24 (56%)	278.82 (67%)	141.05 (36%)
Facility	243.19 (42%)	232.60 (61%)	320.70 (50%)	185.17 (60%)	244.43 (40%)	145.81 (50%)	58.63 (30%)	54.85 (44%)	135.58 (33%)	248.45 (64%)
Cash	555.45	361.16	616.66	302.66	591.35	274.85	197.33	124.27	394.30	370.08
Home	325.41 (59%)	137.00 (38%)	311.89 (51%)	122.04 (40%)	357.37 (60%)	133.83 (49%)	138.70 (70%)	70.16 (56%)	270.42 (69%)	129.29 (35%)
Facility	230.05 (41%)	224.16 (62%)	304.76 (49%)	180.93 (60%)	233.97 (40%)	141.02 (51%)	58.63 (30%)	54.11 (44%)	123.87 (31%)	240.80 (65%)
Tax	0	0	0	0	0	0			0	0
Opport. Cost	22.13	20.59	21.29	7.42	19.21	16.68	2.97	0.82	20.11	19.42
Home	8.91 (40%)	12.16 (59%)	5.26 (25%)	3.18 (43%)	8.61 (44%)	11.89 (71%)	0.68 (23%)	0.08 (10%)	8.40 (42%)	11.77 (61%)
Facility	13.22 (60%)	8.44 (41%)	16.02 (75%)	4.25 (57%)	10.59 (56%)	4.79 (29%)	2.29 (77%)	0.74 (90%)	11.71 (58%)	7.65
Home Total	334.26	149.16	317.13	125.22	365.87	145.72	139.38	70.24	278.82	141.05
Cash	325.41 (97%)	137.00 (92%)	311.89 (98%)	122.04 (97%)	357.37 (98%)	133.83 (92%)	138.70 (99%)	70.16 (100%)	270.42 (97%)	129.29 (91%)
Oppor. Cost	8.91 (3%)	12.16 (8%)	5.26 (2%)	3.18 (3%)	8.61 (2%)	11.89 (8%)	0.68 (1%)	0.08 (0%)	8.40 (3%)	11.77 (9%)
Facility Total	243.19	232.60	320.70	185.17	244.43	145.81	60.92	54.85	135.58	248.45
Cash	230.05 (95%)	224.16 (96%)	304.76 (95%)	180.93 (98%)	233.97 (96%)	141.02 (97%)	58.63 (96%)	54.11 (99%)	123.87 (91%)	240.80 (97%)
Oppor. Cost	13.22 (5%)	8.44 (4%)	16.02 (5%)	4.25 (2%)	10.59 (4%)	4.79 (3%)	2.29 (4%)	0.74 (1%)	11.71 (9%)	7.65 (3%)
Home cash	325.41	137.00	311.89	122.04	357.37	133.83	138.70	70.16	270.42	129.29
Consult.	84.33 (26%)	28.30 (21%)	68.08 (22%)	36.67 (30%)	105.03 (29%)	28.47 (21%)	31.11 (22%)	14.72 (21%)	9.51 (4%)	31.30 (24%)
Drugs	241.08 (74%)	108.70 (79%)	243.82 (78%)	85.37 70%)	252.34 (71%)	105.36 (79%)	107.59 (78%)	55.44 (79%)	260.92 (96%)	97.98 (76%)
Pharm.	*145.36 (60%)*	*52.80 (49%)*	*152.47 (49%)*	*31.85 (37%)*	*175.96 (70%)*	*59.74 (57%)*	*32.33 (30%)*	*9.68 (17%)*	*175.77 (67%)*	*59.54 (61%)*
Facility cash	230.05	224.16	304.76	180.93	233.97	141.02	58.63	54.11	123.87	240.80
Treatment	119.44 (52%)	129.60 (58%)	161.76 (53%)	66.12 (37%)	123.75 (53%)	76.61 (54%)	31.22 (53%)	44.84 (83%)	83.93 (68%)	167.69 (70%)
Transport	61.25 (27%)	51.43 (23%)	67.37 (22%)	33.33 (18%)	62.18 (27%)	61.31 (43%)	22.22 (38%)	8.06 (15%)	4.23 (3%)	70.59 (29%)
Other	49.36 (21%)	43.13 (19%)	75.63 (25%)	81.48 (45%)	48.04 (20%)	3.10 (2%)	5.19 (9%)	1.21 (2%)	35.71 (29%)	2.52 (1%)
No. obs	320	280	190	135	156	137	135	124	142	119
No. obs. w/ Tot. cost=free	109 (34%)	125 (45%)	59 (31%)	66 (49%)	49 (31%)	62 (45%)	59 (44%)	63 (51%)	49 (35%)	53 (44%)

EXHIBIT A-5
EPISODE TIME (WAITING AND TRAVEL, HOME AND FACILITY; STD DEV. IN PARENTHESES)

Time and Earnings	General Population			Malaria-like		Females		< 45% p.c.expen		Child < 15 yrs	
	Pre-	Post-	W. test	Pre-	Post-	Pre-	Post-	Post-	Post-	Post-	Post-
SAY											
Adult hourly earnings (FCFA)	19.15 (29.74)	23.69 (31.34)	1.72	20.45	24.35	20.74	24.12	6.71	7.15	18.26	23.22
Episode Time Spent (hrs)	0.91 (2.89)	1.32 (5.74)	0.87	0.97	1.18	1.02	1.17	0.33	0.64	0.81	0.96
Episode Home Time (hrs)	0.40 (1.56)	0.30 (1.17)	0.64	0.45	0.23	0.37	0.25	0.11	0.15	0.37	0.31
Episode Facility Time (hrs)	0.51 (2.17)	1.02 (5.60)	1.48	0.52	0.95	0.65	0.92	0.22	0.49	0.44	0.65
BOBOYE											
Adult hourly earnings (FCFA)	19.37 (22.18)	17.26 (21.53)	1.79	19.75	18.68	18.49	17.67	5.28	5.40	21.47	18.44
Episode Time Spent (hrs)	0.92 (2.06)	0.97 (2.01)	1.05	0.97	0.94	0.86	0.96	0.85	0.62	0.77	1.05
Episode Home Time (hrs)	0.33 (1.18)	0.23 (0.96)	4.40*	0.29	0.22	0.30	0.18	0.26	0.06	0.28	0.27
Episode Facility Time (hrs)	0.59 (1.38)	0.74 (1.66)	0.22	0.68	0.72	0.56	0.78	0.59	0.56	0.49	0.78
ILLÉLA											
Adult hourly earnings (FCFA)	17.35 (18.90)	14.87 (17.26)	1.91*	17.25	12.33	18.47	13.34	5.92	5.89	18.86	14.02
Episode Time Spent (hrs)	0.87 (2.29)	0.67 (2.26)	3.36*	0.87	0.51	0.82	0.57	0.51	0.15	0.84	0.73
Episode Home Time (hrs)	0.31 (1.22)	0.27 (1.31)	3.87*	0.27	0.15	0.27	0.33	0.09	0.01	0.35	0.31
Episode Facility Time (hrs)	0.56 (1.81)	0.40 (1.62)	3.40*	0.60	0.15	0.55	0.24	0.42	0.13	0.49	0.42

EXHIBIT A-6
SAY—MEAN AND STANDARD DEVIATIONS OF DEPENDENT & INDEPENDENT VARIABLES

	General Population		Malaria-like cases		Females		<45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Household size	8.94 (4.61)	8.56 (5.52)	9.32 (4.88)	9.19 (6.15)	9.01 (4.96)	8.71 (5.43)	10.26 (4.54)	8.89 (3.57)	9.23 (4.21)	8.89 (5.41)
No. working adults	4.42 (2.73)	3.98 (2.96)	4.52 (2.50)	4.34 (3.42)	4.47 (2.71)	3.98 (2.97)	4.80 (2.62)	3.80 (1.72)	4.25 (2.26)	3.89 (3.02)
w/health fac.	22%	19%	21%	22%	23%	22%	7%	7%	24%	21%
p.c expend/month	2,143.31 (2,261.20)	2,625.30 (3,283.10)	2,158.19 (2,317.19)	2,584.18 (3,116.89)	2,103.56 (2,578.87)	2,632.59 (3,640.02)	664.84 (322.26)	693.59 (300.56)	1,897.70 (2,248.46)	2,229.39 (2,337.84)
beddays: 1-5	44%	48%	52%	52%	42%	52%	43%	45%	48%	52%
beddays: 5+	27%	18%	28%	20%	26%	15%	26%	21%	26%	20%
female	46%	54%	50%	55%	100%	100%	46%	56%	44%	56%
age $\leq$ 15 yrs	45%	54%	48%	58%	43%	54%	55%	56%	100%	100%
15 < age $\leq$ 40	31%	26%	27%	25%	38%	30%	22%	20%	0	0
Djerma	28%	19%	29%	20%	22%	20%	24%	17%	30%	17%
Peulh	37%	37%	34%	38%	40%	38%	39%	40%	33%	39%
Malaria-like	56%	52%	100%	100%	60%	53%	59%	51%	61%	55%
Ep. Total Costs	440.52 (1,046)	444.96 (1,281)	507.36 (1,242)	344.95 (973)	544.97 (1,261)	280.53 (771)	165.72 (505.05)	164.29 (377)	293.68 (697)	299.93 (900)
Ep. Cash Costs	419.58 (1,017)	396.04 (1,131)	484.59 (1,207)	306.93 (842)	519.01 (1,226)	244.65 (625)	163.55 (501.53)	159.66 (370.55)	270.64 (650)	270.51 (840)
Ep. Opp. Costs	21.24 (71.69)	48.92 (282.35)	22.92 (75.77)	38.01 (219.89)	26.37 (85.79)	35.87 (215.41)	2.17 (10.18)	4.62 (11.67)	23.04 (78.88)	29.42 (92.66)
no. obs.	285	346	159	181	131	188	121	148	125	178

EXHIBIT A-7
BOBOYE—MEAN AND STANDARD DEVIATIONS OF DEPENDENT & INDEPENDENT VARIABLES

	General Population		Malaria-like cases		Females		< 45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Household size	11.12 (5.74)	9.40 (4.4)	11.551 (6.24)	9.43 (4.73)	11.02 (5.82)	9.74 (4.64)	10.95 (4.83)	9.25 (3.99)	11.47 (5.78)	9.60 (4.56)
No. working adults	5.45 (3.08)	4.53 (2.44)	5.74 (3.49)	4.58 (2.68)	5.48 (3.24)	4.62 (2.51)	5.20 (2.19)	4.27 (2.13)	5.25 (3.00)	4.38 (2.48)
w/health fac.	20%	17%	23%	18%	19%	18%	12%	10%	23%	19%
p.c expend/month	2,171.87 (2,345.83)	1,993.88 (2,822.98)	2,284.06 (2,536.64)	2,183.18 (3,197.42)	2,093.65 (2,447.62)	1,986.99 (2,820.56)	578.50 (248.26)	575.73 (260.71)	2,236.80 (2,399.79)	1,955.26 (2,679.31)
beddays: 1-5	46%	48%	50%	49%	46%	50%	45%	50%	52%	56%
beddays: 5+	22%	21%	18%	21%	24%	21%	24%	17%	22%	19%
female	55%	52%	57%	55%	100%	100%	57%	53%	51%	53%
age $\leq$ 15 yrs	50%	50%	50%	46%	47%	50%	49%	51%	100%	100%
15 < age $\leq$ 40	32%	27%	35%	33%	38%	35%	33%	25%	0	0%
Djerma	83%	78%	81%	79%	83%	81%	87%	83%	81%	76%
Malaria-like	47%	54%	100%	100%	49%	56%	49%	50%	48%	51%
Ep. Total Costs	427.80 (1,291)	342.70 (881)	474.38 (1,617)	321.75 (828)	392.22 (886)	274.19 (772)	171.60 (432)	136.60 (173)	335.79 (746)	276.10 (620)
Ep. Cash Costs	408.95 (1,273)	317.85 (834)	457.73 (1,602)	300.73 (797)	374.51 (864)	251.03 (738)	166.41 (422)	133.14 (167)	319.30 (726)	242.48 (499)
Ep. Opp. Costs	18.88 (61.17)	24.85 (111.75)	16.64 (40.96)	21.02 (90.17)	17.71 (61.95)	23.17 (95.97)	5.19 (14.69)	3.45 (10.24)	16.54 (58.08)	33.62 (148.10)
no. obs.	666	543	311	291	366	285	259	230	322	255

EXHIBIT A-8
ILLÉLA—MEAN AND STANDARD DEVIATIONS OF DEPENDENT & INDEPENDENT VARIABLES

	General Population		Malaria-like cases		Females		< 45% p.c. expend.		< 15 years old	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Household size	8.94 (5.27)	8.10 (4.25)	9.14 (5.63)	8.46 (4.22)	8.68 (5.35)	8.08 (4.33)	9.44 (4.61)	9.49 (4.63)	9.11 (5.14)	8.73 (4.40)
No. working adults	4.36 (2.53)	3.95 (2.14)	4.40 (2.73)	4.11 (2.23)	4.27 (2.38)	3.70 (2.00)	4.46 (2.13)	4.42 (2.36)	4.25 (2.58)	4.03 (2.15)
w/health fac.	22%	17%	24%	15%	27%	15%	21%	17%	23%	18%
p.c expend/month	1,992.90 (1,965.38)	1,848.77 (2,993.16)	1,950.41 (2,035.09)	1,379.68 (1,265.30)	2,088 (2,051.29)	1,474.37 (1,257.90)	641.41 (249.60)	612.47 (200.47)	1,958.85 (1,843.54)	1,528.09 (1,484.19)
beddays: 1-5	35%	39%	38%	43%	40%	44%	40%	41%	37%	41%
beddays: 5+	32%	16%	30%	15%	34%	15%	26%	14%	34%	16%
female	49%	49%	52%	50%	100%	100%	49%	49%	48%	50%
age $\leq$ 15 yrs	47%	46%	51%	40%	46%	47%	46%	46%	100%	100%
15 < age $\leq$ 40	29%	34%	32%	36%	36%	41%	28%	34%	0%	0%
Hausa	89%	84%	91%	87%	90%	82%	87%	85%	88%	84%
Malaria-like	59%	48%	100%	100%	63%	49%	61%	50%	65%	45%
Ep. Total Costs	577.45 (1,641)	381.75 (1,042)	637.83 (1,950)	310.39 (950.23)	610.31 (1,821)	291.53 (861)	200.30 (522)	125.09 (316)	414.40 (1,590)	389.51 (1,107)
Ep. Cash Costs	555.45 (1,592)	361.16 (998)	616.66 (1,894)	302.96 (933.99)	591.35 (1,780)	274.85 (823)	197.33 (520)	124.27 (315)	394.30 (1,556)	370.08 (1,069)
Ep. Opp Costs	22.13 (89.70)	20.59 (118.59)	21.29 (90.81)	7.42 (27.97)	19.21 (72.74)	16.68 (75.08)	2.97 (7.32)	0.82 (2.99)	20.11 (59.99)	19.42 (78.41)
no. obs.	320	280	190	135	156	137	135	124	142	119

REFERENCES

Abel-Smith, B., and P. Rawal. 1992. "Can the poor afford 'free' health services? A case study of Tanzania," *Health Policy and Planning* 7:4,329-341.

Akin, J.S., D.K. Guilkey, and B.M. Popkin. 1981. "The demand for child health services in the Philippines," *Social Science and Medicine* 13c,249-257.

Akin, J.S., C.G. Griffin, and D.K. Guilkey. 1986a. "The demand for adult outpatient services in the Bicol region of the Philippines," *Social Science and Medicine* 22:3,321-328.

Akin, J.S., C.G. Griffin, and D.K. Guilkey. 1986b. "The demand for primary health care services in the Bicol region of the Philippines," *Economic Development and Cultural Change* 34:4,755-782.

Bitran, R. 1989a. "Household Demand for Medical Care in Santo Domingo, Dominican Republic." USAID Health Care Financing in Latin America and the Caribbean, Research Report No.9.

Bitran, R. 1989b. "A Household Health Care Demand Study in the Kisantu and Bokoro Regions of Zaire, Volume III." Resources for Child Health Project Working Paper.

Campbell, D.T., and J.C. Stanley. 1963. *Experimental and Quasi-Experimental Designs for Research.* Boston: Houghton Mifflin Company, 6,47-50.

Cook, T.D., and D.T. Campbell. 1979. *Quasi-Experimentation: Design & Analysis Issues for Field Settings.* Boston: Houghton Mifflin Company, 115-117.

Creese, A. 1991. "User charges for health care: A review of recent experience." *Health Policy and Planning* 6:4,309-319.

Diop, F. 1993. "Cost Recovery Pilot Tests in the Non-Hospital Sector: Household Survey of the Demand for Health Care in the Boboye, Illéla, and Say Districts, October-December 1992—Health Care Utilization Patterns." Technical Note No.23. USAID Health Financing and Sustainability Project. Bethesda, MD: Abt Associates.

Diop, F., M. Kailou, and O. Oumarou. 1993. "Pilot Tests on Cost Recovery in the Non-hospital Sector: Six Month Report on the Performance of Cost Recovery in the Boboye and Say Districts, May to October, 1993." USAID Health Financing and Sustainability Project. Bethesda, MD: Abt Associates.

Diop, F., R. Bitran, and M. Makinen. 1994. "Evaluation Economique des Tests Pilotes de Recouvrement des Couts dans le Secteur Non-Hospitalier." USAID Health Financing and Sustainability Project. Bethesda, MD:TR-16F. Abt Associates.

Donebedian, A. 1980. *Explorations in Quality Assessment and Monitoring: The Definition of Quality and Approaches to its Assessment.* Volume 1. Health Administration Press.

Duan, N., W. Manning, C. Morris, and J. Newhouse. 1982. *A Comparison of Alternative Models for the Demand for Medical Care.* RAND Publication, R-2754-HHS.

Duan, N. 1983. "Smearing Estimate: A Nonparametric Retransformation Method," *Journal of the American Statistical Association* 78:385,605-610.

Duan, N., W.G. Manning, C.N. Morris, and J.P. Newhouse. 1983. "A Comparison of Alternative Models for the Demand for Medical Care," *Journal of Business and Economic Statistics* 1:2,115-126.

_____ 1984. "Choosing Between the Sample Selection Model and the Multi-part Model," *Journal of Business and Economic Statistics* 2:3, 283-289.

Ellis, R.P., and G. Mwabu. 1991. *The Demand for Outpatient Medical Care in Rural Kenya.* Unpublished manuscript. Boston University, Department of Economics.

Gertler, P., L. Locay, W. Sanderson, A. Dor, and J. van der Gaag. 1988. "Health Care Financing and the Demand for Medical Care." World Bank Living Standards Measurement Study Working Paper No.37.

Grootaert, C. 1983. "The Conceptual Basis of Measures of Household Welfare and their Implied Survey Data Requirements," *The Review of Income and Wealth* 29:1,1-22.

Hay, J., and R.P. Olsen. 1984. "Let Them Eat Cake: A Note on Comparing Alternative Models of the Demand for Health Care," *Journal of Economic and Business Statistics* 2:3,279-28.

Health Financing and Sustainability Project. 1991. "Health Financing and Sustainability Project Applied Research Agenda, 1991 through 1994." Bethesda, MD: Abt Associates Inc.

Heckmann, J.J. 1979. "Sample Selection Bias as a Specification Error," *Econometrica* 47:153.

Heller, P.S. 1982. "A Model of the Demand for Medical and Health Services in Peninsular Malaysia," *Social Science and Medicine* 16,267-284.

Lavy, V., and J.M. Germain. 1993. "The Effect of Quality and Cost on Health Care Choice in a Developing Country." Unpublished manuscript. The World Bank.

Litvack, J. 1992. "The Effects of User Fees and Improved Quality on Health Facility Utilization and Household Expenditure: A Field Experiment in the Adamaoua Province of Cameroon." Ph.D. Thesis, Fletcher School of Law and Diplomacy.

Lubitz, J., J. Beebe, and G. Riley. 1985. "Improving the Medicare HMO Payment Formula to Deal with Biased Selection," *Health Economics and Health Services Research* 6,101-122.

Matji, M., P. Ts'oene, A. Spencer, and P. Gertler. 1993. "The Impact of User Fees on the Demand for Health Care: What Can Service Statistics Tell Us?" Case Study of Lesotho. Draft Report. Ministry of Health, Kingdom of Lesotho and RAND Corporation.

Mwabu, G., M. Ainsworth, and A. Nyamete. 1993. "Quality of Medical Care and Choice of Medical Treatment in Kenya: An Empirical Analysis." World Bank, Africa Technical Department, Technical Working Paper No.9.

Newhouse, J.P., W.G. Manning, E.B. Keeler, and E.M. Sloss. 1989. "Adjusting Capitation Rates Using Objective Health Measures and Prior Utilization," *Health care Financing Review* 10:3,41-4.

Phelps, C. 1992. *Health Economics.* New York: Harper Collins.

Roemer, M.I., and C. Montoya-Aguilar. 1988. "Quality Assessment and Assurance in Primary Health Care." Vol.105. WHO Offset Publication.

Siegel, S., and N.J. Castellan. 1988. *Nonparametric Statistics for the Behavioral Sciences*. New York: McGraw-Hill Book Company, 102-166.

Tobin, J. 1958. "Estimation of Relationships for Limited Dependent Variables," *Econometrica* 26,24-36.

USAID. 1991. "Inventory of Tools." Quality Assurance Project. Bethesda, MD: Center for Human Services.

Waddington, C., and K.A. Enyimayew. 1989. "A Price to Pay: The Impact of User Charges in Ashanti-Akim District, Ghana," *International Journal of Health Planning and Management* 4:17,17-47.

Waddington, C., and K.A. Enyimayew. 1990. "A Price to Pay: Part 2: The Impact of User Charges in the Volta Region of Ghana," *International Journal of Health Planning and Management* 15,287-312.

Walton, M. 1986. *The Deming Management Method.* New York: Perigree.

Weaver, M., M. Chapko, R. Ndamobissi, R. Kornfield, C. Blewane, and A. Sathe. 1993. "Technical Report, Estimating the Willingness to Pay for Quality of Care: Comparison of Contingent Valuation and Traditional Economic Methods." Unpublished technical paper, USAID Health Financing and Sustainability Project. Bethesda, MD: Abt Associates Inc.

Welch, W.P., R. Frank, and P. Diehr. 1985. "Health Care Costs in Health Maintenance Organization." In *Advances in Health Economics and Health Research,* edited by R.M. Scheffler and L.F. Rossiter. Greenwich, CT:JAI Press, 6,75-95.

Wouters, A., O. Adeyi., and R.H. Morrow. 1993. "Quality of Health Care and Its Role in Cost Recovery—with a Focus on Empirical Findings about Willingness to Pay for Quality Improvements." HFS Major Applied Research Project, Phase I: Review of Concepts and Literature, and Preliminary Field Work Design Technical Report. USAID Health Financing and Sustainability Project. Bethesda, MD: Abt Associates.

Wouters, A. 1990. "The cost of acute outpatient primary care in a preferred provider organization." *Medical Care.* 28:7,573-585.

Yazbeck, A., and M. Wenner. 1994. "Social Financing in Niger." HFS Major Applied Research Project, Phase III: Analysis. USAID Health Financing and Sustainability Project. Bethesda, MD: Abt Associates.